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British Museum (Natural History)
Dept. of Zoology
Catalogue of shield reptiles

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Catalogue of Shield Reptiles.

Part II.

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OF

THE BRITISH MUSEUM.

CATALOGUE

OF

SHIELD REPTILES

IN

THE COLLECTION

OF

THE BRITISH MUSEUM.

PART II.

EMYDOSAURIANS, RHYNCHOCEPHALIA, AND AMPHISBÆNIANS.

BY

JOHN EDWARD GRAY, F.R.S. &c.

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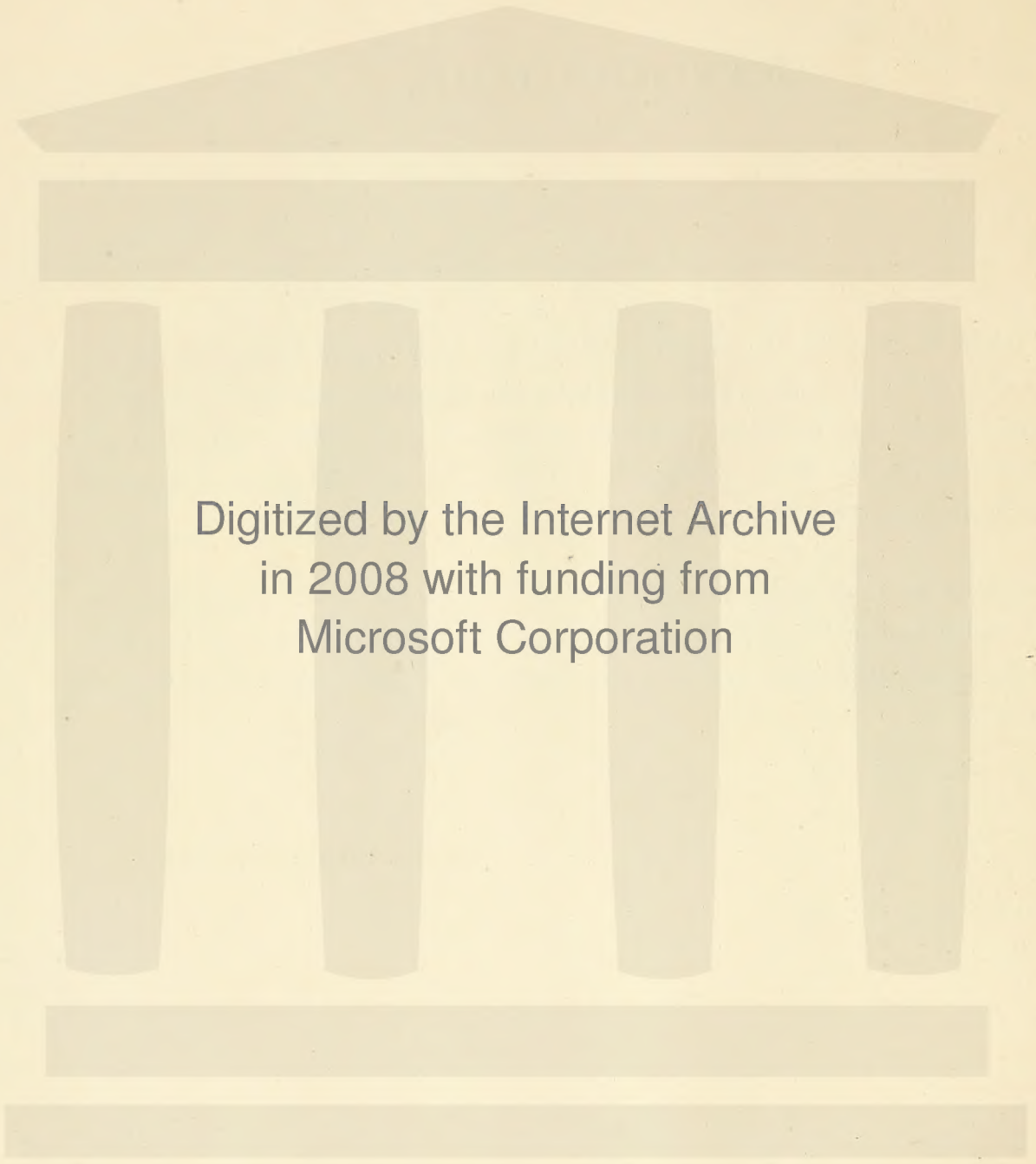
INTRODUCTION.

The chief object in preparing the present Catalogue has been to give a complete account of all the species of Emydosaurians, Rhynchocephalia, and Amphisbænians now in the British Museum, and of those species which are known to exist in other Cabinets, but which are at present desiderata in the Museum, to enable travellers, collectors, and others to assist in completing the National Collection.

The woodcuts are those which were prepared to illustrate the series of papers on the arrangement and determination of the species of these animals first published in the 'Proceedings of the Zoological Society,' and have been kindly lent by the Council of the Society for the purpose.

JOHN EDWARD GRAY.

British Museum, September 7th, 1872.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CATALOGUE

OF

SHIELD REPTILES.

Order EMYDOSAURI (EMYDOSAURIANS).

Emydosauri, *Blainville.*
Gray, Ann. Phil. x. p. 195, 1825; *Cat. Tortoises and Crocodiles Brit. Mus.* p. 38, 1844.
Crocodilia, *Owen, Report on British Fossil Reptiles, Report of Brit. Assoc.* 1841, p. 65.
Huxley, Journ. Proc. Linn. Soc. Zool. iv. p. 1.

Head large, covered with a thin skin; ears linear, closed with two valves; gape wide; tongue short; jaws with a single series of conical teeth inserted in sockets and replaced by teeth formed beneath them; hinder part of the lower jaw produced behind the condyle; nostrils small, anterior; eyes small. Throat with two glands. Neck and sides of the body with a wrinkled skin, covered with small tubercular scales. Back with a hard disk, formed of longitudinal series of square, keeled, bony plates imbedded in the skin; under surface covered with smooth, thin, square plates; back of the neck with two groups of bony plates, the first called the nuchal, and the other the cervical plates. Tail compressed, with two series of compressed plates above. Vent longitudinal. Legs short; feet webbed; toes 4–5, but only the inner 3 of each foot clawed.

Living in fresh and brackish water; almost exclusively in tropical climates. Eating animals which they have killed by drowning.

The distinction of the species of Crocodiles has hitherto been one of the difficult problems in systematic zoology; and therefore I believe that it may be of some slight use to give the result of the examination of the very large collection of Crocodiles of all ages and from various localities which are contained in the British Museum. Knowing the difficulty that surrounds the subject, great exertions have been made to obtain specimens from different countries; and the examination of these specimens has shown that the characters of the species, when allowance is made for the changes that take place in the growth of the animal, are quite as permanent as in any other group of Reptiles, and not more difficult to define.

An outline of the synopsis of the Crocodilidæ and Alligatoridæ was published in the 'Annals and Magazine of Natural History' for 1862 (3rd series, vol. x.). Since that period additional specimens have been examined which have been received in the British Museum, and also those in other collections, especially the skulls in the museum of the Royal College of Surgeons, the specimens in the two museums at Liverpool, and in other local collections within reach. Among the specimens recently received by the British Museum are some typical skulls from the Dutch possessions in the East, obtained from Leyden, which enable us to determine with certainty the species described by the Dutch zoologists.

The determination of the species has always been attended with considerable uncertainty; and if we may

judge by the manner in which the specimens and the skulls of them are named in Museums, or sent about by the more scientific dealers, it would appear that as yet they are not properly understood.

I do not mean as to the precise limit of a species—that is to say, whether the specimens from different districts of the same zoological or geographical province are mere local varieties of the same species or are distinct; for that is a question which I admit must, with the materials at our command, for the present remain unsolved and open to discussion. But it is not unusual to find most distinct species confused under the same name, and specimens of the same species, only different in age, separated under two or more names.

I have endeavoured to condense into a short synopsis the principal leading characters, especially those furnished by the examination of the skull and the nuchal and dorsal plates, by which the different species of Crocodiles and Alligators may be most easily determined, the object being to furnish the zoologist with the best character to distinguish the different species of Crocodile and Alligator without any pretence of giving an account of the comparative anatomy or osteology of the species. I make this statement, as confusion arises in the student's mind between the object of the studies of the two branches of the science, both equally important; but the one ought to be based on the examination and comparison of the largest possible number of specimens and species, while the most important papers on comparative anatomy are often those which arise from the examination of a single example of the animal.

There is a prejudice against such short essays; and they incur the reproach of certain continental and native naturalists; but after considering their objection and their practice, I am still of opinion that papers of the kind are far more useful to the working naturalist than the long descriptions of species which it is the custom of these naturalists to prepare, when their descriptions, instead of merely presenting the character of the species under consideration, give in full detail under each species (so as to hide in a mass of words the characters which you are looking for) the character of the genus or even of the family or order to which the species belongs. MacLeay well observes, "The modern art of describing is too long, often insufferably long, while human life remains as short as ever" (Illustr. Zool. S. Africa, p. 54).

I know by experience that synoptical papers take far more mental and bodily labour to prepare than the description of a single specimen, often taken at haphazard and regarded as the type of a species because it presents some striking peculiarities of appearance.

This memoir, short as it is, is the result of the examination and repeated reexamination at different periods of more than two hundred specimens of Crocodiles,—a series of the most characteristic specimens of each species having been laid out so that they could be viewed and studied together at leisure, and their peculiarities and likenesses noted down.

If all the notes made during these comparisons were printed, as is the custom with many naturalists, they would fill many pages, and thus make a large work. Many papers and books are estimated by their size rather than by the extent of labour that has been bestowed upon them; while the results of much labour and careful study, condensed into a few pages, are often spoken of by critics, who never undertook such researches, or who dislike the labour of condensing their observations into systematic order, as merely the short notes of a hasty examination: at least that is the way in which some papers, which were the results of equally extensive examinations, have been regarded by naturalists who should have known better.

I may further observe that even after so much study, when new specimens have been accumulated and with additional experience, one finds peculiarities overlooked and facts requiring verification when the old and newly acquired specimens are submitted to a reexamination and study. It is this experience that makes me inclined to place less reliance than other naturalists upon essays prepared by persons who come and look at a series of specimens for the first time and describe them offhand. Yet such works are often regarded as of authority, very often on account of their length or the beautiful manner in which they are printed or illustrated.

The references to the 'Catalogue of the Osteological Specimens in the College of Surgeons' are based on the examination of specimens in that collection; and I have to thank the Council of the College for their permission to examine them, and Mr. Flower, the energetic Curator of the collection, for his kindness and assistance in determining them.

If any evidence were required of the difficulties of determining the species of this family, I need only refer to the nomenclature of the skulls in the Catalogue above referred to, which was prepared by the late Curator of the collection, Professor Owen.

In this collection, for example, I found what I consider to be three distinct species in one case, and two distinct species in another, confounded under the same name; and,

on the other hand, I found what I regard as skulls of the same species inserted under three different names.

The skull of a Crocodile which is found in the internal rivers of India is named *Crocodilus rhombifer*, Cuvier, (which is an American species,) though the specimen in the College Museum was received from Bengal.

I do not by any means regard my determination of these skulls as infallible; but I have taken every care to render it correct by repeated examination. I first arranged the skulls as they appeared to be alike, according to the characters here assigned to them, without paying any attention to the names given, placing them in order according as their size showed the change in the growth; and Mr. Flower, Mr. Gerrard, and some other zoologists who are used to the examination of bones agree with me in my determination, and were much interested in observing how gradually the skulls of different ages glided into each other.

I must observe, if there is this difference of opinion in the determination of skulls of recent Crocodiles, where the series of skulls of animals different in age can be compared, and where the skulls are in a perfect state, how much more difficult it must be to have confidence in the determination of the skulls of fossil species, where the skulls are generally more or less imperfect, and perhaps only single specimens (often very imperfect specimens) have been examined!

The chief difficulty in distinguishing the species has originated from the very great changes that take place in the shape and proportions of the head of the animal in its different stages of growth; but the changes seem nearly similar in all the species, and therefore when once observed they can be easily allowed for. The difference may be divided into three stages, exemplified in the young, the nearly full-grown, and the adult or aged specimens. The head and beak of the young are generally depressed, with more or less distinctly marked symmetrical ridge and depressions; and these characters are gradually modified until the animal assumes its nearly full size—the skull becoming thicker and more solid, but yet retaining most of the characters that distinguish its young state. After this period, as the animal increases in age, the skull becomes more and more convex, swollen, and heavy, and assumes a very different external form.

It is to be observed that in all these changes in the external form of the skull, the bones themselves of which it is composed preserve their general form and relation to each other; and the sutures between these bones appear to me to offer some of the best characters for separating the species into groups. In many instances, when I have been in doubt, the sight of the intermaxillary suture has at once solved the difficulty, which has been verified by the observation of the locality of the specimen.

These changes in the form of the head have been among the causes that have made the study of the species of Crocodiles so difficult. If this is the case with the recent species, how much more caution is requisite to determine the fossil remains of the animal! Cuvier set a very good example in that respect: he commenced the study of each group of animals with an examination of the osteology and external characters of the living species, and then applied the knowledge he thus acquired to the distinction of the fossil remains; but now we often find palæontologists, as they call themselves, neglecting, or, at most, only taking the outline of the osteological and zoological characters of the living species at second hand, and describing the fossil, and often forming a genus and species on a small fragment, thus encumbering the science with a multitude of names.

At one time I proposed to give accurate measurements of the different parts of the skull of each of the specimens of the different species in the British-Museum collection; but I am satisfied that the importance of such tables of measurements is overestimated: no doubt it has a very imposing appearance; but a good figure is more useful than any amount of measurement. Every species has its normal measurements; but these are liable to vary in the different individuals; and any difference sufficient to show a distinction of species is easily appreciated by the eye, as it must alter the general proportions of the different parts of the head.

It has been suggested that I ought to give the description of each separate bone of which the skull is composed. This may be of use to the student of comparative anatomy, but is not of so much importance to the zoologist; for though each bone has a normal form in each species of Crocodile, yet they are each liable to considerable variation within certain limits in the different individuals of the species. The bones of the different genera have been described in several works on osteology, and have been well figured by De Blainville and others.

De Blainville, in his 'Ostéographie,' devotes five folio plates to the osteology and dentition of recent Crocodiles, giving details of *Crocodilus biporcatus*, *C. lucius*, *C. vulgaris*, *C. Schlegelii*, *C. longirostris*, *C. rhombifer*, and *C. sclerops*. These plates were prepared to accompany an essay that M. de Blainville was preparing for the 'Mémoires de l'Académie des Sciences de France' when he died.

Professor Carl Bernhard Brühl, of the Universities of Cracow and Pesth, has published twenty quarto etchings of

the skeletons of Crocodiles and Alligators, giving details of three or four species. The plates are exceedingly accurate and full of details, being drawn and etched by the Professor and his wife direct from the specimens. They were published at Vienna in 1862. There is a continuation of the work containing three additional plates, published in 1865, principally devoted to the canals of the ear-bone.

I must here refer to a paper by Professor Huxley, entitled "On the Dermal Armour of *Jacare* and *Caiman*, with Notes on the Specific and Generic Characters of recent Crocodilia." As this paper contains an excellent account of the osteological differences between the different genera of Crocodilia, I have not considered it desirable to repeat them here, more especially as they were chiefly drawn up from specimens in the British Museum.

Subsequently to my Synopsis, Dr. Alexander Strauch published a memoir on the recent species of Crocodiles in the Mém. Acad. Sc. St. Pét. x. No. 13, 1866, pp. 120. He gives a compiled synopsis and diagnosis of all the species known, and of the synonymy, with their habitats, illustrated by a map, and a detailed description of the thirteen species in the St.-Petersburg Museum. But the specimens examined, characterized, and described are generally young; and there is an evident want of material for so extensive a work, as is generally the case with the continental authors who do not visit the English collections.

Synopsis of the Families.

A. *The cervical and dorsal plates forming one dorsal shield.*

1. **GAVIALIDÆ.** The large front teeth and the canines in the lower jaw fit into notches in the margin of the upper jaw.

B. *The cervical shield forms a small group, which is separate from the dorsal shield.*

2. **CROCODILIDÆ.** The canines fit into notches in the upper jaw, and the large front teeth fit into pits or perforations in the front of the upper jaw.

3. **ALLIGATORIDÆ.** The large front teeth and the canines fit into pits or perforations in the edge of the upper jaw.

The large front teeth of the Garials fit into a notch in the front of the upper jaw, and the canines into a notch also. In the Crocodiles the canines fit into a notch, as in the Garials, but the large front teeth into pits or perforations in the front of the upper jaw; and in the Alligators both the canines and the large front teeth fit into pits or perforations in the edge of the upper jaw.

The geographical distribution of the genera may be thus exhibited:—

Africa.	Asia and Australasia.	America.
	Fam. *Gavialidæ*.	
	Gavialis.	
	Tomistoma.	
	Fam. *Crocodilidæ*.	
Crocodilus.	Oopholis.	Palinia.
Halerosia.	Bombifrons.	Molinia.
Mecistops.		
		Fam. *Alligatoridæ*.
		Alligator.
		Caiman.
		Jacare.

In Africa there are three species of Crocodiles. They all seem to have been known to Adanson. They are:—(1) the common Crocodile (called the Olive Crocodile by Adanson), *Crocodilus vulgaris*, which is spread over the whole of Africa, from north to south, and from east to west; (2) the Black Crocodile of Adanson (*Halerosia nigra*); and (3) the False Gavial of Adanson (the *Mecistops cataphractus*). The two latter are confined to the rivers on the west coast of Africa.

In India there are also three species of Crocodiles:—(1) the *Oopholis porosus* (or *Crocodilus biporcatus* of Cuvier), which is found only in the estuaries at the mouths of the large rivers; (2) the Muggar (*Bombifrons indicus*); and (3) the Garial or Ghurrial, which is confined to rivers in the interior of the country. The Coombeer or Muggar ascends the rivers to the mountains, where the water is often frozen. The Ghurrial, on the contrary, is confined to the lower level, where the climate is warm.

In stating that there are three species of Crocodiles in India, I only intend to state that there are three distinct forms; for I will not undertake to say, for certain, that the Muggar of Ceylon, of Siam, and of India are not distinct species.

Mr. Blyth observes—"Both the Gangetic species of Crocodiles have been received by the Asiatic Society, Calcutta, from Java. The Crocodiles are known to abound in Timor, from which island they may well have passed to Australia. Governor Grey met with them in the north-west."—*Blyth, Rep. Austral. Vert. in Mus. A. S. C.*

If by "both the Gangetic species of Crocodile" Mr. Blyth means the estuarine Crocodile (*Oopholis porosus*) and the Coombeer or Muggar (*Bombifrons indicus*), no example of the latter animal from either Java, Timor, or Australia has occurred to me, and the animal figured as *Crocodilus raninus* by Dr. Salomon Müller is certainly *Oopholis porosus*; and there is in the British Museum a

fine adult skull of that species, sent by the Leyden Museum from Java.

The observations of MM. Duméril and Bibron (Erp. Gén. pp. 25, 47), that Crocodiles are not found in Australia, and that the American Crocodiles are confined to the islands of that continent, are no longer consistent with facts; indeed, long before the publication of their work, various travellers had recorded the occurrence of Crocodiles on the north coast of Australia.

The estuarine *Oopholis porosus* was observed by Governor Grey on the north-west coast of Australia. There is in the British Museum a skull of the species sent thence, and also a full-grown specimen killed and preserved in that country.

The island of Borneo is inhabited by a false Garial named *Tomistoma Schlegelii*. I am not aware that it has been found in any other island of the archipelago. It is intermediate in character between the true Garial and the Crocodiles.

The Crocodiles and Alligators are widely distributed in America. There are four American Crocodiles, and nine Alligators. One of the Crocodiles (*Palinia rhombifer*) is peculiar to the island of Cuba; the other species of Crocodiles and the Alligators are found on the mainland. The *Alligator mississipensis* is found far north, where the waters are often frozen; all the other Alligators and American Crocodiles are confined to the tropical and subtropical parts of the continent. *Molinia americana* is found in Cuba and St. Domingo, as well as in the rivers of the east and west side of the continent, showing the incorrectness of the assertion of MM. Duméril and Bibron that the Crocodiles of America are confined to the islands of that continent (Erp. Gén. pp. 25, 47).

Fam. I. GAVIALIDÆ.

The cervical and dorsal plates formed into a single continuous shield. Teeth nearly of uniform size, all fitting into notches on the edge of the upper jaw. The front large teeth fitting into a notch in the front, the canines into a notch on the sides of the front of the upper jaw. The jaws elongate, slender.

Crocodilidæ (part.), *Gray, Ann. Philos.* x. p. 195, 1825.
Crocodilidæ § *, *Gray, Cat. Tort. and Crocod. B. M.* p. 36.
Gavialidæ, *Huxley, Journ. Proc. Linn. Soc. Zool.* iv. p. 16, 1859.

Synopsis of the Genera.

1. **Gavialis.** Beak elongate, linear, end swollen. The lateral teeth oblique, not received into pits.
2. **Tomistoma.** Beak conical, thick at the back, the lateral teeth erect, received into pits between the teeth.

1. GAVIALIS.

Beak of skull linear, end dilated from the enlarged nostrils. Teeth $\frac{27-27}{25-25}$ or $\frac{28-28}{26-26}$.

The mandibular symphysis extends to the twenty-third or twenty-fourth tooth. Most of the lateral teeth of both jaws are directed obliquely, and not received into interdental pits. The front margin of the orbit is much raised.

Gavial, *Oppel.*
Le Gavial, *Cuvier.*
Gavialis, *Merrem.*
Gray, Ann. Phil. x. p. 195, 1825; *Cat. Tortoises &c. B. M.* pp. 36, 57, 1844; *Trans. Zool. Soc.* 1869, vi. p. 132.
Geoff. Mém. Mus. xii.
Huxley, Proc. Linn. Soc. Zool. iv. p. 20, 1859.
Gavialia, *Fleming, Phil. Zool.*
Ramphostoma, *Wagler, Syst. Amph.* p. 441.
Rhamphognathus, *Vogt, Zool. Brief.* ii. p. 289.

1. Gavialis gangeticus. (The Garial or Nakoo.)

Narrow-beaked Crocodile, *Edw. Phil. Trans.* xlix. p. 639, t. 19.
Le Gavial, *Lacép. Q. O.* p. 1235, t. 15.
Faujas, Mont. S. P. p. 235, t. 8. f. 46, 47.
Lacerta gangetica, *Gmelin, S. N.* i. p. 1057.
Shaw, Zool. iii. p. 197, t. 60.
Crocodilus longirostris, *Schneid. Amph.* p. 160.
Daudin, Rept. p. 4293.
Blainv. Ostéog. Croc. t. 2. f. 4, t. 3. f. 6, t. 4. f. c, t. 5. f. 5.
Crocodilus arctirostris, *Daud. Rept.* ii. p. 393.
Crocodilus tenuirostris, *Cuvier, Ann. Mus.* x. t. 1.
Tiedem. Amph. t. 15.
Wagler, Syst. t. 7. f. 111.
Merrem, Tent. p. 38.
Gavialis gangeticus, *Geoff. Mém. Mus.* xii.
Gray, Syn. Rept. p. 36; *Cat. Tort. &c. B. M.* p. 57; *Trans. Zool. Soc.* 1869, vi. p. 132.
Dum. & Bib. Erp. Gén. iii. p. 135, t. 26. f. 2.
Huxley, Journ. Proc. Linn. Soc. Zool. iv. p. 20, 1859.
Brühl, Skelet. Krokod. t. 8, 9, 10, 11, 17.
Strauch, Syn. Crocod. p. 63.
Crocodilus gangeticus, *Tied. Oppel, and Libosch., Naturg. Amph.* p. 81, t. 14.
Geoff. Mém. Mus. H. N. xii. p. 118.
Burm. Gavial, t. 4 (skulls).
Gavialis longirostris, *Merrem, Amph.* p. 37.
Gavialis tenuirostris, *Merrem, Amph.* p. 38.
Guérin, Icon. R. Anim. t. 2. f. 3.
Ramphostoma tenuirostre, *Wagler, Nat. Syst. Amph.* p. 141, t. 8. f. 3.
Le Gavial, *Lacép. H. N. Q. Ovip.* i. p. 235, t. 15.

Gavial, *Owen, Monogr. Fossil Reptilia of the London Clay*, t. xi. 1849 (skeleton).

Hab. Indian rivers. Bengal, Nepal, Malabar.

2. TOMISTOMA.

Beak of the head conical, thick at the base. Teeth $\frac{20-20}{18-18}$.

The mandibular symphysis extends to the fifteenth tooth; the hinder tooth of the upper jaw and most of those of the lower jaw received into interdental pits. Premaxillary hardly expanded, orbital margins not raised.

Gavialis, sp., *Müller, Owen, Strauch.*
Tomistoma, *S. Müller, Wiegm. Arch.* 1846, i. p. 122.
Gray, Trans. Zool. Soc. 1860, vi. p. 133.
Rhynchosuchus, *Huxley, Journ. Proc. Linn. Soc. Zool.* iv. p. 16, 1859.

The upper edge of the intermaxillary bone extends back as far as the second canine tooth; and in this character it differs from the skull of the slender-nose Crocodiles, as *Crocodilus Gravesii* and *Mecistops cataphractus*.

Dr. Falconer, when describing the skull of *Crocodilus cataphractus* in Ann. & Mag. Nat. Hist. 1846, xviii. p. 362, observes, "*Crocodilus Schlegelii* constitutes the passage from the true Crocodiles into the Gavials," and he shows how the skull agrees with the Crocodiles' in the position of the nasal bones.

Prof. Owen, in the first 'Essay on the Reptiles of the London Clay,' Crocodiles, p. 15, observes, "The Bornean species, *Crocodilus Schlegelii*, was in fact originally described as a new species of Gavial; but the nasal bones, as in the fossil from Sheppey (fig. in t. 2. f. 5), extend to the hinder borders of the external nostrils." This does not agree with our skull, nor with the figures of the skull in Blainville's 'Ostéographie.' See also Huxley, Journ. Proc. Linn. Soc. Zool. iv. p. 18.

1. Tomistoma Schlegelii. (Bornean Gavial.)

Crocodilus gavialis Schlegelii, *Müller, Naturgesch. Ost-Ind.* t. 123. f. 1–5.
Crocodilus Schlegelii, *Blainv. Ostéog. Crocod.* t. 2. f. 3, t. 5. f. 4.
Brühl, Skelet. Krok. t. 8. f. 6.
Owen, Fossils of the London Clay, p. 15.
Burm. Gavial, t. 2. f. 7 (skull).
Rhynchosuchus Schlegelii, *Huxley, Proc. Linn. Soc.* iv. p. 17 (1859); *Ann. & Mag. Nat. Hist.* 1859.
Mecistops Journei, *Gray, Cat. Tort. &c. B. M.* p. 38 (not synon.).
Tomistoma Schlegelii, *Gray, Trans. Zool. Soc.* 1869, vi. p. 134.
Gavialis Schlegelii, *Strauch, Syn. Crocod.* p. 63.

Hab. Australasia, Borneo (*Müller*, Brit. Mus.).

The two figures of the skull in *Müller & Schlegel*, t. 3. f. 1 & 2, show the difference that occurs in the form of the skull of the same species.

In the British Museum there is a young specimen in spirits, and an adult skull received from the Leyden Collection, and a very fine adult skull from Borneo, obtained from Mr. Mitten.

Fam. II. CROCODILIDÆ.

The cervical plates forming a distinct shield, separate from the dorsal shield. Teeth strong, very unequal in size, hinder larger. The 9th upper and the 11th lower tooth larger, like canines, the large teeth of the lower fitting into pits or perforations, and the canines fitting into notches on the edge of the upper jaws. Nose of both sexes simple.

The upperside of the intermaxillary is slightly expanded behind, and its hinder end is divided and separated into two parts by the front end of the nasal bone.

Crocodilidæ § **, *Gray, Cat. Tort. &c. B. M.* p. 36, 1844.
Crocodilidæ, *Huxley, Proc. Linn. Soc. Zool.* iv. p. 5.
Crocodilus, *Cuvier.*
Gray, Ann. Phil. 1825, x. p. 195.
Champse, *Merrem, Tent.*

Professor Huxley divides this family into two genera, *Crocodilus* and *Mecistops*. See Journ. Proc. Linn. Soc. Zool. iv. p. 6.

The Crocodiles when they are first hatched have a very short beak to the head. This is even the case with the long-beaked *Mecistops cataphractus*, which in its very young state is hardly to be distinguished in the form of its beak from the young of the common Crocodile, *Crocodilus vulgaris*. As the young obtain strength the beak developes itself more or less rapidly according to the species, until its normal character is attained.

The head seems to continue of nearly the same form, merely increasing in size, for some time, perhaps years; for we know little of the duration of the life of the Crocodiles, and they are probably long-lived animals. As they reach maturity, and as old age creeps on, the skull thickens considerably, and the jaws dilate and thicken on the sides.

The growth of the teeth, which are produced in succession and greatly enlarge in diameter, and the enlargement of the jaws proceed *pari passu*: the latter is also influenced by the development of these teeth and the larger alveoli required to support them.

The head of the Crocodile first increases in length compared with its width, and then, having arrived at a certain form, increases in width, thickness, and solidity.

The same change takes place in the head and skull of the Bornean Garial, *Tomistoma Schlegelii*, as is found in Müller and Schlegel's figures of the half-grown and adult skulls in their work.

It is to be observed that each of the Crocodiles of India and Africa (and it may also be the case with those of America) seems to present two varieties—one with a broad and the other with a narrower face; this variation occurring in each of the species appears to me to show that it is more probably a local, or perhaps even sexual variation than a specific distinction.

If it were a sexual distinction it might soon be settled by observers in the country where they abound; but the sex of the skins and of the skulls sent to Europe is rarely, if ever, marked on the specimens.

The broad-nosed variety is much more abundant in the Museum than the narrow-nosed one; and this is against the form of the face being a sexual distinction, as one would suppose that they would be nearly equal in number, unless the narrow-nosed specimens are the males and they are more wary and not so frequently caught.

Some naturalists might be inclined to regard them as distinct species; but in the Museum series, large as it is, we have not sufficient materials to decide the question with any confidence. Perhaps, if the skulls of specimens from each locality could be compared, other characters might be found; but this must be left for my successors in this field of research.

In the short-nosed species the upperside of the intermaxillary bones is short, and the nasal bones are produced between their edges to the edge of the nostril; and in the genus *Halcrosia* they are produced beyond it, and form a bony septum between the nostrils. In the long and slender-nosed species the intermaxillary bones are rather produced behind, and the nasal bones do not reach the edge as does the long nostril in the genus *Mecistops*; they are considerably short of it; but still the nasal bones come between the hinder ends of the intermaxillaries, and this character at once separates the skull of that genus from the two genera of Garials which have short nasal bones.

The skulls of Crocodiles may be separated thus:—

1. Nasal bone produced and separating the nostril into two parts. *Halcrosia.*

2. Nasal bone produced and dividing the edges of the nostril. *Oopholis, Crocodilus, Molinia* (*americana*), *Bombifrons, Palinia.*

3. Nasal bone not reaching the nostril. *Molinia* (*intermedia*), *Mecistops.*

The intermaxillary bone in *Bombifrons* and *Palinia* is short and truncated behind. In *Halcrosia* it is rather produced behind, the straight sides converging to a point. In all the other genera it is produced behind, with the hinder edges converging on the sides and truncated at the end.

The palatal bone in all the genera is truncated or rounded in front, except in *Mecistops*, where it is narrow, short, and acute in front.

The skulls of the genera *Bombifrons, Oopholis,* and *Molinia* are easily distinguished in the young state,—the face of *Oopholis* being much longer and narrower than that of *Bombifrons*, and that of *Molinia* longer and narrower than that of *Oopholis.* The following measurements are for three skulls which appear to be from animals nearly of the same state of growth, in inches and lines:—

	Bombifrons. in.	lines.	*Oopholis.* in.	lines.	*Molinia.* in.	lines.
Length of skull, entire	4	8	5	8	6	9
Length of face to front of orbit	2	8	3	6	4	4
Length of forehead to front of orbit	2	0	2	1	2	4
Length of palatine from condyle to front end	2	11	3	4	3	10
Length of middle suture of maxilla	1	2	1	1½	1	7
Length of middle suture of intermaxillaries	0	9	1	3	1	6
Width at occiput	2	6	2	5	2	10½
Width at hinder contraction of beak	1	6	1	4	1	4½
Width at notch	0	9	0	9	0	9

The dorsal scales present considerable variations in different specimens from the same locality; but, allowing for such variations, the genera may be arranged thus:—

1. The dorsal scales nearly uniformly keeled, in four or six longitudinal series; the outer series ovate-elongate. *Oopholis.*

2. The dorsal scales nearly uniformly keeled, quadrilateral, as broad as long. *Crocodilus, Palinia, Molinia,* and *Mecistops.*

3. The dorsal scales quadrilateral, as broad as long; the vertebral series scarcely keeled, the lateral series irregular and keeled. *Halcrosia* and *Molinia.*

The eyelid of the genus *Halcrosia* is thickened with hard bony plates, as in some of the Alligators, with which it also agrees in the external form of the head and the disposition of the nuchal shield. In all the other genera it is thin and membranaceous.

Synopsis of the Genera.

Section I. *Cervical disk rhombic, separated from the dorsal shield.* Normal Crocodiles.

A. *Nuchal scutella none. Dorsal plates ovate-elongate, in four or six longitudinal series.* Estuarine Crocodiles.

1. **Oopholis.** Asia and North Australia.

B. *Nuchal plates four, in a transverse series. Dorsal plates as broad as long, square.* Fluviatile Crocodiles.

a. *Intermaxillary bone truncated behind, with a nearly straight hinder edge. Face broad, oblong.*

2. **Bombifrons.** Toes webbed. Legs distinctly fringed. Asia.

3. **Palinia.** Toes short, free. Legs with only an indistinct fringe. America.

b. *Intermaxilliary bone elongate, produced and truncated behind; sutures sloping backwards and converging, then transverse or sinuous. Toes webbed. Legs fringed.*

4. **Crocodilus.** Face oblong, without any ridge from front of orbit; forehead flat. Africa.

5. **Molinia.** Face elongate, forehead convex, smooth, without ridge from orbit. America.

Section II. *Cervical disk strongly keeled on each side and nearly continuous with the dorsal shield.* Aberrant Crocodiles.

* *Face broad, nasal bones produced into the nostrils.* Alligatoroid Crocodiles.

6. **Halcrosia.** Africa.

** *Face very long, slender, nasal bones not reaching the nostrils.* Gavialoid Crocodiles.

7. **Mecistops.** Africa.

I. *The nape with a rhombic disk formed of six plates, which is well separated from the dorsal shield.* Normal Crocodiles.

A. *Nuchal scutella none. Dorsal scales in four or six longitudinal series; the outer series ovate-elongate. Toes webbed. Legs fringed. The intermaxillary bone produced, truncated, and converging on the sides.* Estuarine or brackish-water Crocodiles.

1. OOPHOLIS.

Face oblong; orbits with an elongated, longitudinal, more or less sinuous ridge in front. Nuchal scutella none, or rudimentary. Cervical disk rhombic, of six plates. Dorsal plates uniformly keeled, in four or six longitudinal series; the vertebral series with straight internal edges, the outer ovate-elongate. Legs acutely fringed. Toes broadly webbed. Intermaxillary bone produced, and truncated behind, the sutures sloping backwards and converging, and then transverse or sinuous.

Oopholis, *Gray, Cat. Tort. & Crocod. in B. M.* 1844; *Ann. & Mag. Nat. Hist.* 3rd series, x. p. 267; *Trans. Zool. Soc.* 1869, vi. p. 137.

a. *The dorsal scales in six longitudinal series; the vertebral ones elongated like the others.*

1. Oopholis porosus. (The Saltwater Crocodile.)

Crocodilus porosus, *Schn. Amph.* p. 159.
Gray, Cat. Tort. & Crocod. &c. Brit. Mus. p. 58; *P. Z. S.* 1861, p. 140.
Crocodilus oopholis, *Schn. Amph.* ii. p. 165.
Crocodilus biporcatus, *Cuv. Oss. Foss.* v. p. 65, t. 1. f. 4, 18, 19 (young skulls), t. 2. f. 8.
Müller & Schlegel, Verh. t. 3. f. 6 (middle-aged skull).
Owen, Cat. Osteol. Mus. Coll. Surg. p. 159, nos. 719, 723, 724, 727, 728.
Huxley, Journ. Proc. Linn. Soc. Zool. iv. p. 11.
Blainv. Ostéogr. Crocod. t. 1, t. 3. f. 1, t. 4. f. , t. 52.
Burm. Gavial, t. 2. f. 5 (head).
Strauch, Syn. Crocod. p. 52.
Crocodilus acutus, *Owen, Cat. Ost. M. Coll. Surg.* p. 157. n. 713.
Champse fissipes, *Wagler, Amph.* t. 17.
Crocodilus biporcatus raninus, *Müller & Schlegel, Verh.* t. 3. f. 7 (aged skull).
Oopholis porosus, *Gray, Ann. & Mag. Nat. Hist.* 3rd series, x. p. 267, 1862; *Trans. Zool. Soc.* 1869, vi. p. 138.
Champses biporcatus *and* C. oopholis, *Merrem, Amph.* pp. 36, 37.

Hab. Asia and Australia; India, Bengal, and Penang (*Hardwicke*); China (*Lindsay*); Trincomalee; Borneo (*Belcher*); Tenasserim coast (*Packman*); Siam, Cambogia (*Mouhot*).

Var. *australis*, Günther.
Crocodile, *Landesborough, Explor. of Austral.* i. p. 70.

Hab. North Australia (*Elsey & Kraig*).

Dr. Günther has pointed out to me that all the Australian specimens which we have examined have one cross band of shields less than the Indian specimens; that is to say, they have sixteen, and the Indian specimens seventeen bands of shields from the neck to the base of the tail. That is the case both with the small specimen in spirits and the large specimen, 17½ feet long, which was procured by Mr. Kraig.

In the British Museum there are the skin of an adult from N.E. Australia, another, 13 feet long, received from the Zoological Society, and several (two thirds half-grown) young specimens stuffed, and several young specimens in spirits.

The largest skull in the British Museum is 29 inches long; the adult skulls vary from 29 to 31 inches in length; a half-grown species is 19 inches long. The skull 26 inches long is said to be from an animal caught in Bengal that was 33 feet long.

Cuvier figures the skulls of young and half-grown specimens. S. Müller and Schlegel figure two skulls, one under the name of *C. biporcatus* (f. 6), and the other under the name of *C. biporcatus raninus* (f. 7): the latter seems to be from an adult or aged animal; the former (f. 6) from a full-grown one before the skull is thickened and spread out. Another specimen, figured as *C. biporcatus raninus* (f. 8), appears to be from a specimen of *Crocodilus* or *Bombifrons siamensis*; it certainly is not an *Oopholis*, from the form of the dorsal scales and the presence of the nuchal ones.

There is a good series of skulls of this species in the Museum of the College of Surgeons; but no. 725, named *C. biporcatus* in the Catalogue, is the skull of an adult *Crocodilus vulgaris*; and no. 713, called *C. acutus* in the Catalogue, is *Oopholis porosus*.

The British Museum received from the Leyden Museum an adult skull of the *Crocodilus* (*biporcatus*) *raninus* from Borneo; it is 22 inches long, and agrees in every respect with the *Oopholis porosus* from India.

Mr. Landesborough observes:—"Harmless as this animal is in Australia, we were not anxious for his company in his native element."—*Exploration of Australia*, p. 70.

b. *The dorsal scales in four series; the vertebral series broader than long, the outer series elongate-ovate.*

2. Oopholis pondicherianus. (Pondicherry Crocodile.)

Oopholis pondicherianus, *Gray, Ann. & Mag. Nat. Hist.* 3rd series, x. p. 268; *Trans. Zool. Soc.* 1869, vi. p. 139.
Crocodilus pondicerianus, *Günther, Rept. B. I.* t. 7.

The specimen of this species in the British Museum is small and only just hatched, but it is quite distinct from all the others. The vertebral series of plates are nearly twice as broad as those in *O. porosus*; the others also are rather wider in comparison; all the dorsal scales are more keeled, and the keels of the scales on the side of the base of the tail are wider and more prominent. The black spots are larger and further apart.

The specimen was purchased of M. Parzudaki of Paris, it having formed part of a collection which he received from the French Museum.

B. *Nuchal plates four, or rarely two or five, in a cross series. The dorsal plates as broad as long, in four or six series.* Fluviatile or River Crocodiles.

a. *The intermaxillary bones truncated behind, with a nearly straight premaxillary suture. Face broad, oblong.*

To observe the form of the premaxillary suture in the preserved specimens, it is only necessary to elevate the skin of the front of the palate and lay the bones bare.

* *Toes webbed; legs distinctly fringed.* Asiatic Crocodiles.

2. BOMBIFRONS.

The premaxillary suture straight or rather convex forwards. The face oblong; forehead with nodules in front of the orbits, but no distinct preorbital ridges. Nuchal plates four, in a curved line. Cervical plates six, in the form of a rhombic shield, distinct from the dorsal one. Dorsal plates oblong, rather elongate, all keeled, in six longitudinal series, and with two short lateral series of keeled scales. The legs fringed with a series of triangular elongated scales. Toes webbed.

Bombifrons, *Gray, Ann. & Mag. Nat. Hist.* 3rd series, x. p. 269; *Trans. Zool. Soc.* 1869, vi. p. 139.

Skull with the nostril separate, the internal nostril as broad as wide, with a deep pit on each side in front of it, and rather bent down so as to open nearly horizontally.

1. Bombifrons indicus. (The Muggar.)
(Figs. 1–4.)

The intermaxillary short, nearly semicircular.

Crocodilus vulgaris, var. indicus, *Gray, Syn. Rept.* p. 58, 1831!
Crocodilus dubius, *Geoff. Ann. du Mus.* xii. p. 122?
Crocodilus suchus, var. D, *Dum. Enc. Méth. Rept.* p. 27.
Crocodilus palustris, *Lesson, Bélanger's Voy.* p. 305.
Gray, Cat. Tort. & Croc. B. M. p. 62 (young).
Owen, Cat. Osteol. Mus. Coll. Surg. pp. 164 & 752!
Günther, Rept. B. Ind. t. 8. f. *a*.
Strauch, Crocod. p. 48.
Crocodilus bombifrons, *Gray, Cat. Tort. & Croc. B. M.* p. 59, 1844 (adult)!
Crocodilus bombifrons (palustris?), *Huxley, Proc. Linn. Soc. Zool.* iv. p. 13!, 1859.
Crocodilus biporcatus, *Cautley, Asiat. Researches*, xix. t. 3. f. 1, p. 3! (not *Cuvier*).
Crocodilus trigonops, *Gray, Cat. Tort. & Croc. B. M.* p. 62, 1844 (young)!
Bombifrons trigonops, *Gray, Ann. & Mag. N. H.* 3rd series, x. p. 269!

Fig. 1.

Bombifrons indicus. Skull, adult.

Crocodilus vulgaris, var. B, *Dum. & Bibr. Erp. Gén.* iv. p. 108.
Crocodilus rhombifer, *Owen, Cat. Osteol. Mus. Coll. Surg.* p. 164. no. 752! (not *Cuvier*).
Crocodilus ——?, *Owen, Cat. Osteol. Mus. Coll. Surg.* p. 159. no. 726!
Bombifrons indicus, *Gray, Trans. Zool. Soc.* 1869, vi. p. 140.

Hab. India, Ganges (*Dr. Sayer*); Madras (*Jerdon*); Ceylon (*Kelaart*).

The dorsal shields in four series, all equally keeled, with two irregular series of plates on the sides. The shields are often nearly of the same form and size; but sometimes there are larger and broader shields intermixed in and deranging the series, and at other times the whole vertebral series is formed of wider shields.

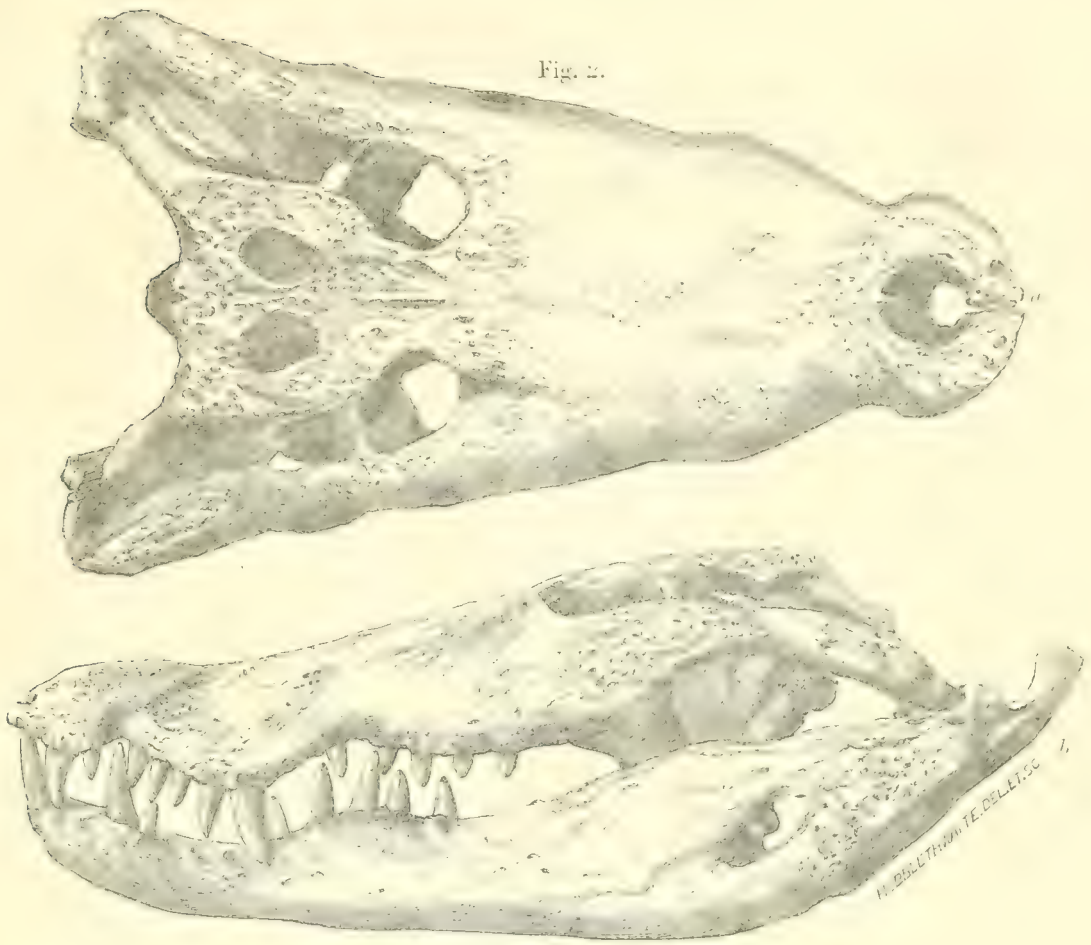
This species has generally been confounded with *Oopholis biporcatus* and *Crocodilus vulgaris*.

The face of the younger specimen is rugulose and depressed, with a deep pit on the sides over the eighth and ninth teeth; there are two arched ridges on each side behind the nostril, and some rugosities in front of the orbits. In the older skull the face is very convex and rounded, rugose, with some more or less distinct rugosities in front of the orbits, but not the distinct longitudinal ridge so characteristic of *Oopholis porosus*.

Prof. Owen described the peculiar form of the premaxillary in a skull in the College-of-Surgeons Museum, sent from Bengal by Dr. Wallich; but he refers the skull to *Crocodilus rhombifer* of Cuvier, which is an American species.

The smallest specimen in the British Museum is 19 inches, and the largest nearly 10 feet long; there are skulls

Fig. 2.



Bombifrons indicus. Skull, nearly adult.

showing that it grows to a much larger size. The specimen I described as *C. trigonalis* is 24½ inches long.

In my Catalogue of the Tortoises and Crocodiles in the British Museum, published in 1844, I described it, from two adult skulls from India of 18 and 20 inches length, as a new species, which I called *Crocodilus bombifrons*, pointing out the straightness of the suture between the intermaxillary and maxillary bones. I observed that I had seen in the Paris Museum a large specimen which had been described by Duméril and Bibron as an adult of *Crocodilus biporcatus*, which appeared to belong to this species, stating that it was immediately known from *C. porosus* by the breadth and convexity of the face.

In the same work I separated the Indian specimen from the common African *Crocodilus*, under the name of *Crocodilus palustris* of Lesson, and pointed out that it seemed to be the same as the *Crocodilus biporcatus raninus* of Müller and Schlegel; and I described two other, very young specimens under the name of *Crocodilus trigonops*, on account of the shortness and width of the head.

The examination of the specimens on which these species were founded, and the comparison of them one with another when ranged in a series, with the other specimens since obtained intercalated in their places according to their size, have convinced me that they are referable to mere variations of growth of a single species, which is generally spread over the Indian peninsula.

Var. Nose narrow, the intermaxillary bones rather longer and narrower.

Hab. Ceylon (skull, *Kelaart*).

There may be two species of Ceylon Muggars, as in one of the heads the intermaxillaries appear to be longer and narrower than in others from the same country. I have not sufficient materials to satisfy myself as to the distinctness of this species and the permanence of the forms.

Fig. 3.

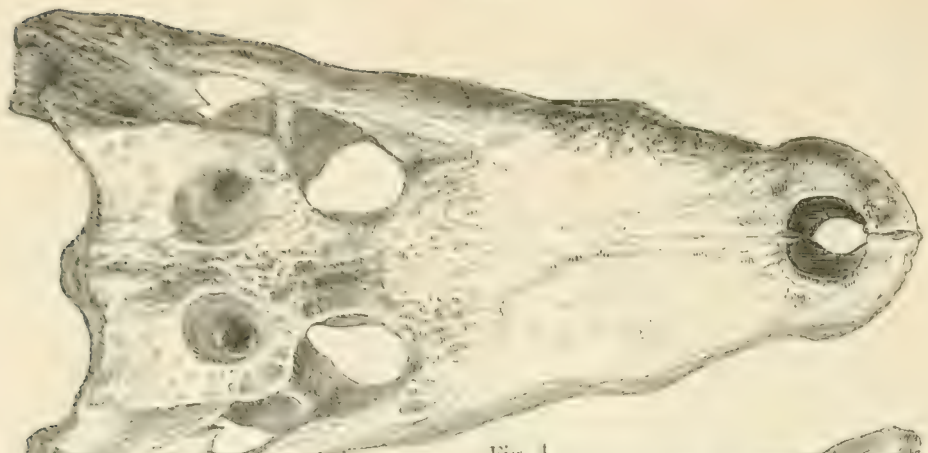
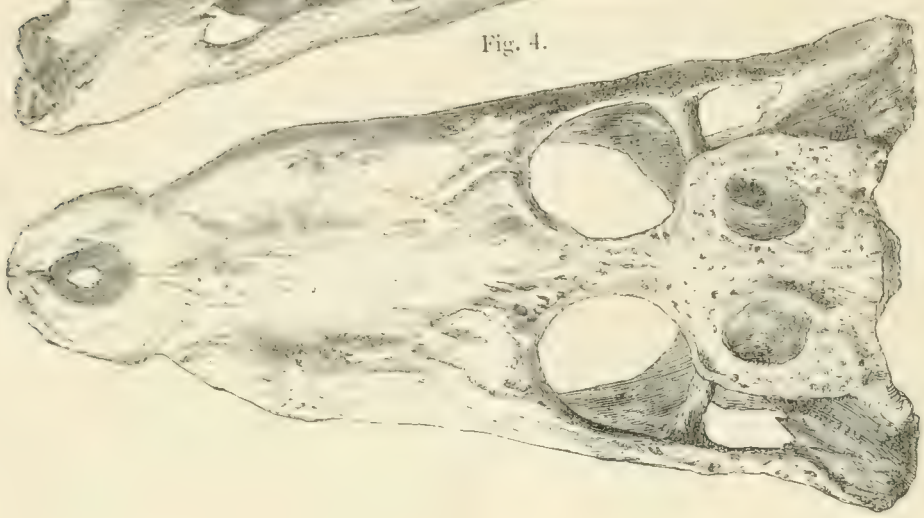


Fig. 4.



Bombifrons indicus. Skull: fig. 3, half-grown; fig. 4, young, nat. size (see *C. trigonops*, Gray).

	Fig. 1.		Fig. 2.		Fig. 3.		Fig. 4.	
	in.	lin.	in.	lin.	in.	lin.	in.	lin.
Length of skull	20	0	17	3	9	10	4	8
Length from occiput to front of orbit	6	9	5	9	3	7	2	8
Length of face	13	3	11	6	6	3	2	0
Length of lower jaw	27	0	23	0	none		5	5
Width at occiput	13	5	10	6	5	11	2	6
Width at hinder notch	9	2	6	9	3	9	1	6
Width at notch	5	4	5	11	2	4	0	9

The face becomes shorter compared with the width of the middle of the face as the animal becomes older.

In the young (fig. 4) the length of the head is rather more than three times the width of the swollen part behind the notch; in fig. 3 it is just three times, and in fig. 2 it is twice and a half the width at the same part; and in the old skull (fig. 1) it is only a little more than twice the width of the face.

As a good illustration of the difference in the appearance of the skulls of the individuals of the species, I may give the measurements of two skulls of "Muggars" from India, of the same size, in the British-Museum collection:—

	Broad variety.	Narrow variety.
	inches.	inches.
Length of the skull along the forehead	$9\frac{7}{8}$	$9\frac{7}{8}$
Length of side of skull	$10\frac{7}{8}$	$10\frac{7}{8}$
Width of back of skull	$5\frac{7}{8}$	$5\frac{1}{2}$
Width in front of orbits	$4\frac{1}{4}$	4
Width over largest tooth	$3\frac{3}{4}$	$3\frac{1}{4}$
Width at notch	$2\frac{1}{2}$	2 or $1\frac{15}{16}$

The broad-nosed variety (fig. 3) was presented by Sir J. Boileau, and the narrow one by Capt. Boys.

When the two skulls are placed side by side, the large teeth are just the same distance apart; and the different teeth in the two skulls exactly agree in size, position, and distance from each other.

2. Bombifrons siamensis. (Siamese Muggar.)

The face depressed, elongate, nearly smooth, with a slight nodule in front of the orbits; intermaxillaries rather elongate, half oblong.

Crocodilus niloticus, *Latr. Rept.* i. p. 206, t. (from *Faujas de St.-Fond, Mont. St.-Pierre*, t. 43).
Crocodilus siamensis, *Schn. Amph.* p. 157.
Gray, Syn. p. 60; *Cat. Tort. & Crocod. B. M.* p. 63 (monstrosity)? (from *Perrault, Hist. Acad. Sci.* iii. p. 255, t. 54).
Günther, Rept. B. I. t. 18. f. 3.
Strauch, Croc. p. 50.
Crocodilus galeatus, *Cuvier, Oss. Foss.* v. p. 52, t. 1. f. 9 (from *Perrault*).
Dum. & Bibr. Erp. Gén. iii. p. 113.
Crocodilus palustris (part.), *Dum. & Bibr. Erp. Gén.* iii. p. 113.
Crocodilus vulgaris (part.), *Gray, Syn.* p. 58.
Dum. & Bibr. Erp. Gén. ii. p. 108?
Müller & Schlegel, Verh. t. 3. f. 9 (head?).
Crocodilus vulgaris, *Owen, Cat. Osteol. Mus. Coll. Surg.* p. 107. no. 718?
Bombifrons siamensis, *Gray, Ann. & Mag. Nat. Hist.* 3rd series, x. p. 269; *Trans. Zool. Soc.* 1869, vi. p. 144.

Hab. Siam, Cambojia (*M. Mouhot*).

There is a well-preserved half-grown specimen of this species in the British Museum. It differs from all the specimens of *Bombifrons indicus* in the collection in the face being much longer and not so tubercular and pitted.

It has four series of nearly equal-sized, uniformly shaped, and keeled shields, with three interrupted series of unequal-sized smaller shields on each of the sides; those of the outer series are the longest.

As the head agrees with the figure of the head from which Schneider named his species, I have retained it; and I have little doubt that the two keels which are present in that specimen are either an individual peculiarity or perhaps a character that developed itself as the animal approached old age.

The skull of the young animal in the Museum of the College of Surgeons, no. 718, appears to belong to this species; but it requires more comparison. It is clearly a *Bombifrons*, and it is much smoother and longer than the skull of *B. indicus* of the same size and age. Prof. Owen observes, "The palatine suture between the premaxillary and maxillary bones passes obliquely backwards a little way at its commencement, and then extends truncated across; but the premaxillary bones are larger than in the second Gangetic Crocodile. There is a small palpebrary ossicle above the anterior angle of the eyes."—*Owen, l. c.* p. 157. no. 718.

There is a young specimen of a Crocodile, received from Singapore, which somewhat resembles the one from Siam in the form of the head, and has six series of strongly keeled shields on the back; but the four middle ones, of nearly equal size and form, and those of the outer series, are narrower, and there is a series of much smaller ones below on each of the sides. I am by no means convinced that this will form a distinct species; it is probably only an accidental or local variety.

** *The legs with an indented fringe of short narrow scales. Toes short, nearly free.* American Crocodiles.

3. PALINIA.

The face oblong; forehead very convex, with a ridge in front of each orbit, converging in front and forming a lozenge-shaped space. Nuchal plates two or four, unequal. Cervical disk rhombic, of six large plates. Dorsal plates large, broad, in six series; the vertebral series nearly smooth, the lateral one strongly keeled. The intermaxillary short, truncated behind the premaxillary, suture straight, transverse. (See Cuvier, Oss. Foss. iii. p. 72, t. 3. f. 1–5.)

Palinia, *Gray, Cat. Tort. & Crocod. B. M.* 1844; *Ann. & Mag. Nat. Hist.* 3rd series, x. p. 270; *Trans. Zool. Soc.* 1869, vi. p. 145.

1. Palinia rhombifera. (Cuban Palinia.)

The upper surface of the forearms and thighs covered with convex keeled scales; the outer edge of the legs and feet with a series of very elongate scarcely raised scales, forming only a slight fringe. The toes short, scarcely webbed.

Aquez palin, *Hernand. Nov. An. Mex.* ii. p. 2.
Crocodilus rhombifer, *Cuvier, Ann. Mus. H. N.* x. p. 51; *Oss. Foss.* v. p. 51, t. 3. f. 1–4.
Tiedem., Oppel, & Lebosch, Nat. Amph. p. 75, t. 10.
Gray, Syn. Rept. p. 59.
Dum. & Bibr. Erp. Gén. iii. p. 97.
Sagra, Cuba, t. 4.
Strauch, Crocod. p. 41.
Crocodilus rhombifer, *Huxley, Proc. Linn. Soc.* iv. p. 10.
Blainv. Ostéog. Croc. t. 5. f. 3 (head?) (not *Owen*).
Burm. Gavial. t. 2. f. 4, t. 3. f. 5 (head).
Crocodilus (Palinia) rhombifer, *Gray, Cat. Tort. & Croc. B. M.* p. 63; *Ann. & Mag. Nat. Hist.* 3rd ser. x. p. 270.
Crocodilus planirostris, *Graves, Ann. Gén. des Sci. Phys. de Bordeaux*, ii. p. 348.
Gray, Syn. Rept. p. 59.
Crocodilus Gravesii, *Bory de St.-Vincent, Dict. Class. H. N.* iii. p. 109, t. .
Dum. & Bibr. Erp. Gén. iii. p. 101.
Palinia rhombifera, *Gray, Trans. Zool. Soc.* 1869, vi. p. 145.

Hab. South America, Cuba (*W. S. MacLeay, Ramon de la Sagra*).

In the British Museum there is a well-grown specimen, 5 feet 4 inches long, of this species, collected in Cuba by M. Ramon de la Sagra, and sent from the French Museum. Two young specimens in spirits, sent from Cuba by Mr. W. S. MacLeay, are almost 2 feet long, are pale brown, with small dots on the head, and a dark spot on the middle of many of the dorsal scutella; the face is irregularly tessellated with square brown spots.

Cuvier described the *Crocodilus rhombifer* from two specimens:—one in the Cabinet of the Academy of Sciences, in a nearly entire state; and the other, a very mutilated skin, in the Museum, which also furnished him with the skull figured in t. 3. f. 1, 2, 3, 4, 5 of his work on Fossil Bones, pp. 51–70. The original habitats of these specimens were not marked. But M. Ramon de la Sagra sent a young living specimen to the Jardin des Plantes, proving that this is an American species; and it is probable that the Crocodile which Hernandez describes and figures as coming from New Spain, under the name of *Aquez palin*, belongs to this species.

M. Graves, in the 'Annales Générales des Sciences Physiques de Bordeaux,' describes a Crocodile under the name of *C. planirostris*, from a specimen which was formerly in the Collection of the Academy of Bordeaux, but is now in the Museum of that town. It was procured from M. Journée, the surgeon of a ship that for some time traded with the negroes of the coast of Congo. M. Bory de St.-Vincent, for these reasons, thought it might have come from Africa; and he figured and described it under the name of *Crocodilus Gravesii* in the Dict. Classique d'Hist. Nat. iii. p. 109, t. .

MM. Duméril and Bibron observe that, when they asked for a new account of the specimen, it was in such a bad condition that they could only reproduce the description written by M. Graves. The study of the description and figure, which are the only materials now left for the purpose, lead to the idea that it was not distinct from *Crocodilus rhombifer*, and was most probably brought from the island of Cuba: the ships which are engaged in trade with the negroes on the coast of Congo frequently visit Cuba; so that it is not at all unlikely that the specimen was brought from that island.

2. Palinia? Moreletii. (Yucatan Palinia.)

Crocodilus Moreletii, *Dum. Arch. du Mus.* vi. p. 255, t. 20; *Cat. Rept.* p. 28. n. 5*.
Strauch, Croc. p. 42.
Palinia? Moreletii, *Gray, Ann. & Mag. Nat. Hist.* 3rd ser. x. p. 271; *Trans. Zool. Soc.* 1869, vi. p. 146.

Dorsal scales keeled, nearly square; scales of the sides and limbs smooth, without tubercles.

Hab. Yucatan; Lac Flores (*M. Morelet*).

This species is described from a specimen in the Museum of Paris, which is very badly figured and indistinctly described in the memoir above cited.

There are two young specimens of Crocodiles, in spirit, without habitats, in the British Museum, which are peculiar in the large size of the nuchal shield, the strength of the keels of the dorsal shields, and the large keeled scales of the forearms and thighs, in which they agree with *Palinia rhombifera*; but there is so much difference between the two, and between each of them and the specimens of that species from Cuba, that I think they must be left in doubt for further elucidation. There are also two small stuffed specimens in the collection (purchased of dealers, but without any locality attached), which are peculiar in having six series of uniform, squarish, very strongly keeled dorsal scales; they are very unlike any other specimen in the collection, and may be new; but I do not like to describe them in the present imperfect state of our knowledge.

b. *The intermaxillary bone elongate, produced and truncated behind; the sutures sloping backwards and converging, and then transverse or sinuous. Toes webbed. Legs with a fringe of elongated triangular scales.*

4. CROCODILUS.

Face oblong, depressed, without any ridge in front of the orbits. Nuchal shields four, in an arched series. Cervical disk rhombic, of six shields. Dorsal plates quadrilateral, as broad as long; the vertebral series rather the widest and most keeled. Intermaxillary produced behind.

Crocodilus, *Gray, Ann. & Mag. Nat. Hist.* 3rd ser. x. p. 271; *Trans. Zool. Soc.* 1869, vi. p. 146.

"The Crocodiles live on the mud-banks or swimming about the rivers" of Africa.

Dr. Balfour Baikie observes:—"The ninth upper tooth of Crocodiles is said to be enlarged like a canine; but this is not correct. I have examined the dentition of eighteen skulls of various species: in the lower jaw there are always nineteen teeth; but in the upper jaw the number in the adult is seventeen on either side, while in the young it is eighteen. This is owing to the second incisor being deciduous; and in old skulls the socket is completely obliterated

by the enlargement of the foramina for the two anterior teeth. Thus in old animals there are only four teeth in each intermaxillary bone, while in the younger individuals there are always five. So, more strictly, it is the tenth, and not the ninth, upper tooth which is enlarged."—*P. Z. S.* 1857, p. 50.

1. Crocodilus vulgaris. (Olive African Crocodile.)

Crocodilus niloticus (part.), *Daud. Rept.* ii. p. 267.
Wagler, Syst. Amph. t. 7. f. 11. 1, 2.
Crocodilus vulgaris, *Cuvier, Oss. Foss.* v. p. 42, t. 1. f. 5 & 12, t. 2. f. 7.
Blainv. Ostéogr. Croc. p. 126.
Gray, Ann. & Mag. Nat. Hist. 3rd ser. x. p. 271; *Trans. Zool. Soc.* 1869, vi. p. 147, f. 5, 6, 7, 8.
Huxley, Proc. Linn. Soc. iv. p. 6.
Burm. Gavial. t. 2. f. 6, & t. 3. f. 9 (head).
Strauch, Croc. p. 43.
Crocodilus suchus, *Geoff. Ann. Mus.* x. p. 84, t. 3. f. 2–4.
Crocodilus chamses, *Bory, Dict. Class. H. N.* v. p. 105.
Crocodilus lacunosus, *Geoff. Croc. d'Egypte*, p. 167.
Crocodilus marginatus, *Geoff. Desc. d'Egypte*, p. 365.
Gray, Cat. Tort. p. 61.
Crocodilus cataphractus, *Rüppell, MS.*
Gray, Syn. Rept. p. 78 (Mus. Frankfort).
Crocodile verd de Sénégal, *Adanson, Sénég.*
Cuvier, Oss. Foss. v. p. 4.
Crocodilus acutus, *Owen, Cat. Osteol. Mus. Coll. Surg.* p. 157. n. 715 (not *Cuvier*).
Crocodilus binuensis, *Balfour Baikie, P. Z. S.* 1857, xxv. pp. 49, 50 (skull described).
Green Crocodile, *Gray, Rep. of Brit. Assoc.* 1862, *Sections*, p. 107.

Hab. African rivers. Living on the mud-banks: North Africa, Egypt; West Africa, Senegal (*Adanson*), Gaboon (*Murray, Cope*); South Africa, Cape of Good Hope; Central Africa, Kwora and Binui (*Baikie*); Madagascar (*Havet.* fide *Cuvier*, Oss. Foss. p. 44); Palestine, river Gischon (*Macgregor*).

The largest specimen in the British Museum is nearly

Fig. 5.

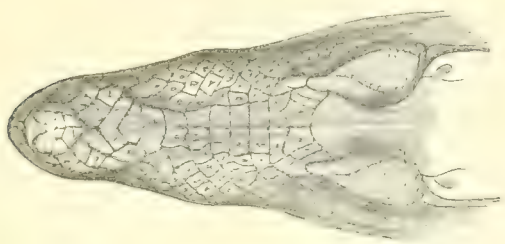


Fig. 7.

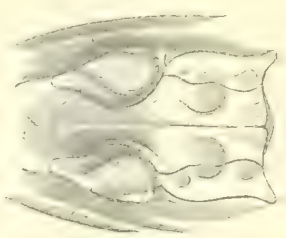


Fig. 6.

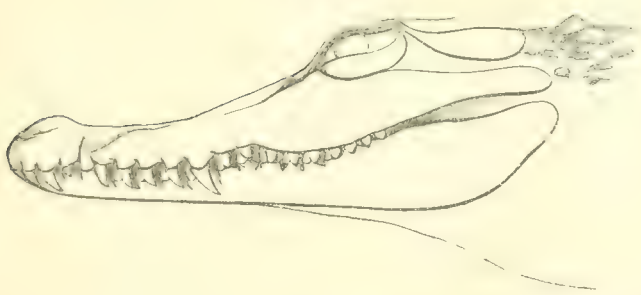
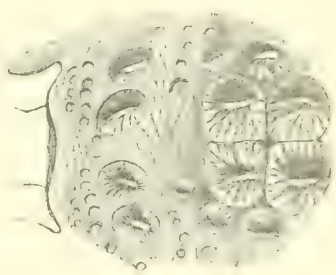


Fig. 8.



Crocodilus vulgaris. Head and nuchal and cervical shields.

15 feet long. There is a very fine skull received from Old Calabar, whose greatest width behind is 13 inches, length above upper surface from end of nose to back of occiput 22 inches, width at the larger lateral tooth $7\frac{3}{4}$ inches, at the notch $4\frac{3}{4}$ inches. The intermaxillary bones are produced backwards between the ends of the maxillæ. The hinder nasal opening is transverse, inferior, and ascending nearly perpendicularly. The nose has two large oblong diverging prominences on the sides—one over the hinder edge of the notch, and the other over the hinder part of the root of the largest tooth, behind the notch.

There is a second skull from West Africa in the Museum, of nearly the same length, which is considerably narrower in all its parts. Length along the upper surface from the end of the nose to back edge of occiput $20\frac{1}{2}$ inches; greatest width behind 12 inches, at largest lateral tooth $6\frac{1}{2}$ inches, at the notch $3\frac{3}{4}$ inches.

These two skulls rather differ in the direction of the

suture behind the maxillary bones; in the wider specimen it is much more produced behind than in the other.

I have examined and compared with care specimens of different ages from North Africa near the Nile, from West Africa at Senegal and Gaboon, South Africa at the Cape of Good Hope and Natal, and a specimen brought from Central Africa by Dr. Baikie; and although they each exhibited certain peculiarities, yet I believe, as far as the specimens at my command enable me to form a judgment, that they all belong to a single species which is generally distributed over the African continent.

At the same time, from the slight differences which the specimens from the different localities do exhibit, I should not be surprised, if we had a complete series of perfect specimens and of skulls of different ages from each locality, to find that there were sufficient differences between them to show that each locality has a special local variety or, perhaps, species; but unfortunately there is not in the British Museum, or in the other museums and collections to which I have access, such a series; all the specimens from the Cape of Good Hope and West Africa seem to be either in the adult or very young state, while those from the other localities are either very young or of an intermediate age. On the other hand, the series of specimens from the same locality, as from S. Africa for example, whence we have most specimens, exhibit variations among themselves quite as great as between the specimens from various parts of Africa. It is therefore more safe to regard them all as one species.

The species grow to a large size; we have a specimen from the Nile and some from the Cape of Good Hope in the British Museum which are nearly 15 feet long.

The skulls which seem to belong to larger specimens often reach the length of 24 or 25 inches.

The history of the Nile Crocodile is given in great detail in the fifth volume of Cuvier's 'Recherches sur les Ossemens Fossiles,' v. p. 43.

Geoffroy St.-Hilaire, in his 'Essay on the Crocodiles of Egypt,' separated the Egyptian specimens into two species, under the name of *Crocodilus lacunosus* and *C. marginatus*. In the 'Annales du Muséum,' vol. x. p. 83, he described a third, under the name of *C. suchus*. Professor Owen has figured the skull of a Crocodile, from an Egyptian mummy, under the name of *C. suchus*, Geoff., in the 'Monograph of the Fossil Reptilia of the London Clay,' published by the Palæontographical Society, 1850, t. 1. f. 2. I do not see how it differs from the Crocodiles at present found in the Nile. See also Huxley, Journ. Proc. Linn. Soc. iv. p. 15.

In the 'Catalogue of Tortoises and Crocodiles,' p. 61, I separated the adult Cape Crocodiles from the North-African specimens, under the name of *C. marginatus*, because the head is not so narrow; but it is to be observed that most of the North-African specimens with which I had compared them were of small size, and consequently had the head less developed.

Dr. Baikie described the Crocodile of Central Africa, found in the river Kwora and Binue (or Niger and Twedda) under the name of *Crocodilus binuensis*; it is of a dark green colour, and lives on the mud-banks or swimming in the rivers.

Mr. Cope ('Proceedings of the Academy of Natural Sciences of Philadelphia' for 1859, p. 296) regards the Crocodile of Equatorial Western Africa (Ogobai) as the *Crocodilus marginatus* of Geoffroy.

Dr. A. Smith, referring the Cape specimens to *Crocodilus marginatus*, observes, "they are occasionally found in the rivers west of Port Natal, but more abundantly in those to the eastward and northward, and occur in such numbers in the rivers in a district north of Kurrichane, between 24° and 22° south latitude, that the natives who used to reside there were known by the appellation *Baquana*=the people of the Crocodile."—*Zool. South Africa*, Appendix, p. 2, 1845.

MM. Duméril and Bibron, in their 'Erpétologie Générale,' iv. p. 104, divided their *Crocodilus vulgaris* into four varieties, thus:—

Var. *a*. The *Crocodilus vulgaris* of Geoffroy, from North Africa, Egypt, and the Nile.

Var. *b*. *Crocodilus palustris*, Lesson, described from a specimen sent from the Ganges by M. Duvaucel, and from the coast of Malabar by M. Dussumier.

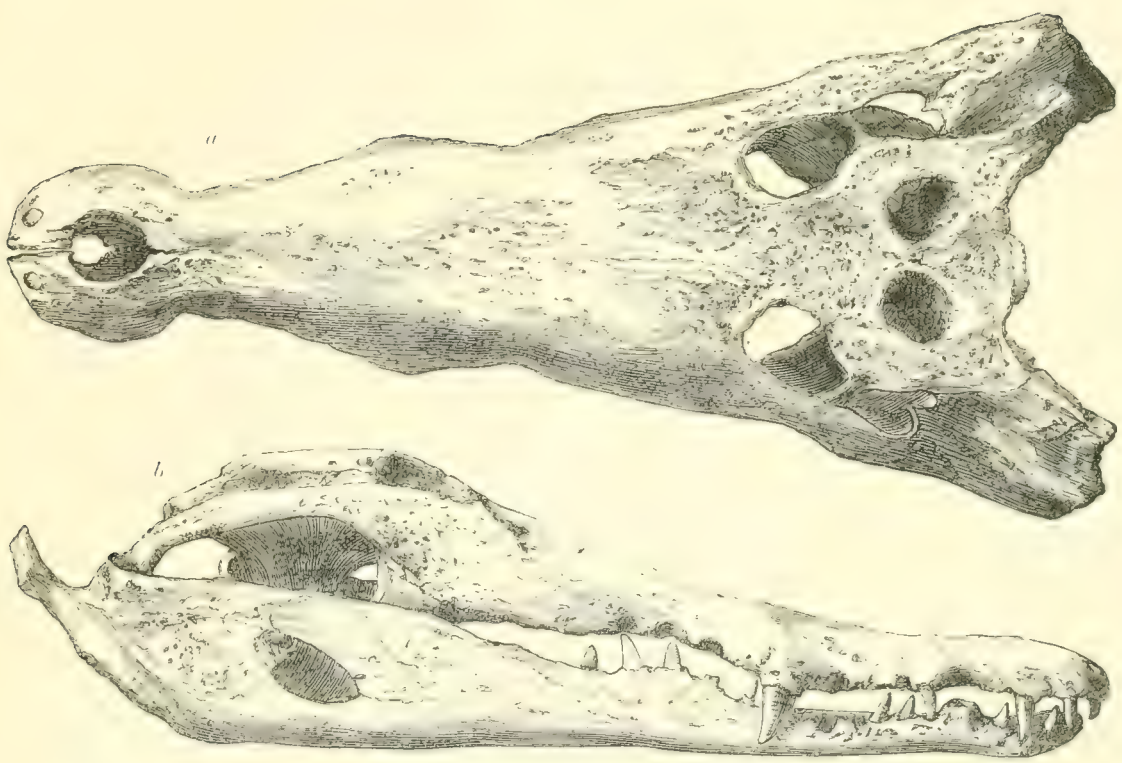
Var. *c*. The *Crocodilus marginatus*, I. Geoffroy, from North Egypt and the Cape of Good Hope.

Var. *d*. The *Crocodile verd* of Adanson, from the Nile, the Niger, and Senegal.

There is no doubt that vars. *a*, *c*, and *d* are true Crocodiles, and are what is considered in this essay to be the *Crocodilus vulgaris* of Africa. Var. *b*, on the other hand, does not belong to the same genus. I have not the slightest doubt this variety is founded on young and half-grown specimens of *Bombifrons indicus*, most distinct from *Crocodilus vulgaris* by the form of the head and the structure of the skull, as MM. Duméril and Bibron would have found if they had examined any of the twelve specimens which they say they procured. They have named the adult specimen in the Paris Museum *C. biporcatus*.

In the 'Ann. & Mag. of Natural History,' vol. xviii. t. 7, Dr. Falconer figures the skull of a Crocodile under the

Fig. 9.



Molinia intermedia. Skull, adult.

name of *C. marginatus*, which is in the Belfast Museum. It is said to have been brought from Sierra Leone; but I think this must be a mistake: it is not like the skull of any Crocodile I have seen from West Africa, and it is not a bad representation of the skull of a half-grown *Bombifrons indicus* from India. Can the habitat be a mistake? Perhaps the habitat was only intended for the first-described species, *Cataphractus mecistops*, for which it is the true locality.

A skull of *Crocodilus vulgaris* is described in Professor Owen's 'Catalogue of the Osteological Specimens in the Museum of the College of Surgeons' under the name of *Crocodilus acutus*, p. 157. no. 715.

5. MOLINIA.

Face elongate; forehead swollen, convex, especially in the adult; orbits without any anterior ridge. Nuchal plates two or four, small. Cervical disk rhombic, of six plates, the side plates generally small. The legs fringed with a series of triangular elongate scales. Toes webbed. Scales of the forearm and thigh thin, smooth. Muzzle oblong, elongate, slender, with a swollen convexity on the middle of the face before the eyes. Nostril not separated by a long ridge: the internal nostril posterior, with an oblong sloping opening; the intermaxillary suture produced between the ends of the maxillæ.

Molinia, *Gray, Ann. & Mag. Nat. Hist.* 3rd ser. x. p. 272; *Trans. Zool. Soc.* 1869, vi. p. 150.

* *Face slender. Dorsal plates irregular; the central series small, keeled; lateral scattered, strongly keeled. Nasal bones produced to the nostrils.* Molinia.

1. Molinia americana. (American Crocodile.)

Crocodilus americanus (Plumieri), *Schn. Amph.* ii. p. 23.
Gray, Cat. Tort. & Croc. &c. B. M. p. 60.
Crocodilus acutus, *Geoff. Ann. Mus.* ii. p. 53, t. 57. f. 1.
Cuvier, Oss. Foss. v. t. 1. f. 3 & 14, t. 2. f. 5.
Gray, Syn. p. 60.
Dum. & Bibr. Erp. Gén. iii. p. 120.

Crocodilus acutus, *Owen, Cat. Osteol. Spec. Mus. Coll. Surg.* p. 157. nos. 711, 712, 714, 716; *Rept. of London Clay*, t. 25. f. 10.
Brühl, Skelet. Krokod. t. 8 & 9, t. 10, t. 17.
Burm. Gavial. t. 2. f. 1, 3, & t. 3. f. 5, 6, 7 (head).
Crocodilus americanus (acutus, *Cuv.*), *Huxley, Journ. Proc. Linn. Soc.* iv. p. 11, 1869.
Molinia americana, *Gray, Ann. & Mag. Nat. Hist.* ser. 3, x. p. 272; *Trans. Zool. Soc.* 1869, vi. p. 150.
?? Crocodilus biscutatus (part.), *Cuv. Oss. Foss.* x. t. 2. f. 6.
Tiedem. Amph. t. 12.
Crocodile de St.-Domingue, *Geoff. Ann. du Mus.* ii. p. 53, t. 27. f. 1.

Hab. Tropical America. Cuba (*W. S. MacLeay*); Jamaica (*B. M.*); West Ecuador, Nicaragua (*Fraser, Richardson*): West coast of America (*Belcher*); St. Domingo (*Cuvier*); Guatemala (*Salvin*).

The specimens in the British Museum vary in length from 19 to 103 inches; and the skulls show that they grow to a larger size.

Crocodilus pacificus from Guatemala, *C. lewyanus* from Columbia, and *C. mexicanus*, Bocourt, Nouv. Arch. Mus. iv. (with two plates of animal and skull), are probably only varieties of this species.

Var. with two additional small cervical scutella behind the others.

Crocodilus americanus, var?, *Gray, Cat. Tort. & Croc. B. M.* p. 60.
Crocodilus acutus, var., *A. Dum. Cat. Rept.* p. 28; *Arch. du Mus.* vi. p. 256.
Molinia americana, var., *Gray, Ann. & Mag. Nat. Hist.* x. p. 272; *Trans. Zool. Soc.* 1869, vi. p. 151.

Hab. West coast of America (*Belcher*); Mexico (*Warwick*).

Cuvier, in his 'Essay,' gives the history of this species under the name of "Le Crocodile à museau effilé, ou de Saint-Domingue (*Crocodilus acutus*, nob.)," Oss. Foss. v. p. 458, and figures the skull at t. 1. f. 3 & 14, and the nuchal shield at t. 2. f. 5.

Professor Brühl described and figured the skeleton of this species in his work. There is the skeleton of a well-grown specimen in the British Museum, and several skulls. The central prominence of the hinder part of the muzzle is sometimes much less developed than in the typical skulls.

** *Face very slender. Dorsal plates nearly uniform. Nasal bones not produced quite to the nostrils.* Temsacus.

2. Molinia intermedia. (Orinoco Crocodile.) (Fig. 9.)

Dorsal plates in six rows, all slightly and nearly equally elevated; the keels of the two vertebral series rather larger than the others, quadrilateral, rather broader than long; the lateral ones oval, with five or six large plates forming an interrupted line on the sides.

Crocodilus intermedius, *Graves, Ann. Sci. Phys.* ii. p. 344.
Gray, Syn. p. 59.
Crocodilus Journei, *Bory, Dict. d'Hist. Nat.* v. p. 3.
Dum. & Bibr. Erp. Gén. iii. p. 129.
A. Duméril, Arch. du Muséum, x. p. 172, t. 14. f. 3 (head).
Huxley, Proc. Linn. Soc. iv. p. 11.
Crocodile de l'Orénoque, *Parzudaki, MS.*
Mecistops Journei (part.), *Gray, Cat. Tort. & Croc. B. M.* p. 58 (from *Bory*).
Molinia intermedia, *Gray, Ann. & Mag. Nat. Hist.* ser. 3, vol. x. p. 272; *Trans. Zool. Soc.* 1869, vi. p. 151, pl. 32. figs. 4–6.
?? Mecistops bathyrhynchus, *Cope, Proc. Acad. Nat. Sci. Philadelphia*, 1860, xii. p. 550 (skull).

Hab. America: Orinoco.

There is a young specimen in spirits in the British Museum, sent by M. Brandt, of Hamburg, as *Crocodilus acutus*, and an adult skull, 20 inches long, received from Paris as *Crocodile de l'Orénoque*, and a second very large skull purchased in London.

In my Catalogue of Tortoises and Crocodiles in the British-Museum collection, from all I could then learn, I was induced to believe that the *Crocodilus intermedius* of Graves was the same as the *Crocodilus Schlegelii* of Borneo, and I therefore called the Bornean animal *Mecistops Journei*. M. Duméril, in his paper in the 'Archives du Muséum,' not seeing the mistake, says that I refer the true *Crocodilus intermedius* to the genus *Mecistops*, and suggests that the *Crocodilus acutus* ought also to belong to it.

M. Auguste Duméril, for the purpose of comparing the head of this Crocodile with that of *Crocodilus leptorhynchus* of West Africa, gave a figure of the head and front part of the back of the *Crocodile de Journée* (Archives du Muséum, x. p. 173, t. 14. f. 3); but it does not appear whether it is from a specimen, or only an enlarged copy of the figure of M. Bory de St.-Vincent. If the latter, it is so embellished that one is unable to discover its origin.

Mr. Cope states that I have identified his *Mecistops brachyrhynchus* with the "*C. intermedius* of Graves;" with the limited published materials as a basis he has reached a different conclusion. (Cope, Proc. Acad. Nat. Sci. Philad. 1865, p. 185.)

Fig. 10.

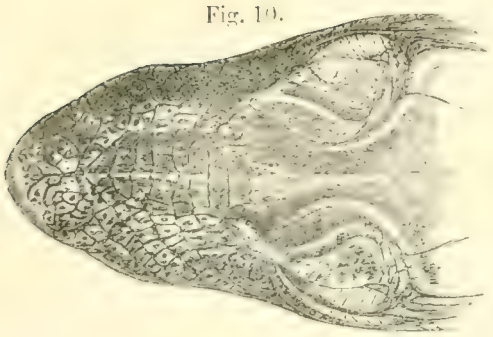


Fig. 12.

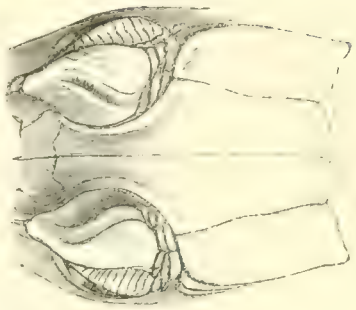
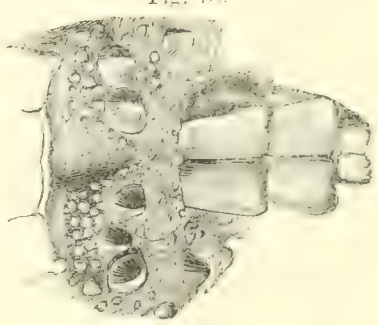


Fig. 11.

Fig. 13.



Halcrosia nigra, young. Head and cervical and nuchal plates.

II. *Nape with a broad flat-topped shield formed of two or three pairs of keeled plates, strongly keeled on each side, and nearly continuous with the dorsal shield. Legs fringed. Toes webbed.* Abnormal Crocodiles.

A. *Face broad; nasal bone produced into the nostril.* Alligatoroid Crocodiles.

6. HALCROSIA.

The premaxillary suture transverse, rather convex backwards. Nasal bones produced beyond the intermaxillary, and forming a bony septum between the nostrils. The palatine bone produced to the same level as the lateral opening—that is, to the lateral inflection of the skull. The face oblong, broad, without any ridge in front of the orbit. Eyelids with two bony plates. Nuchal plates four, in a cross row, strongly keeled. Dorsal plates in four series; the central broad, slightly keeled; the outer narrow, distinctly keeled; sides with large convex scales.

Halcrosia, *Gray, Ann. & Mag. Nat. Hist.* 3rd series, x. p. 273; *Trans. Zool. Soc.* 1869, vi. p. 152.

Osteolæmus, *Cope, Proc. Acad. Nat. Sci. Philad.* xii. p. 550.

Prof. Lilljeborg has described an *Halcrosia Afzelii* from a specimen in the Swedish Museum, sent by Afzelius from Sierra Leone (Proc. Zool. Soc. 1867, p. 715); but it appears to be only a slight variety of *Halcrosia nigra*.

Mr. Cope claims priority for the genus *Osteolæmus*, and states that his *O. tetraspis* should not be identified with *Halcrosia nigra* (Proc. Acad. Nat. Sci. 1867, p. 200); but it appears to be only a slight variety.

Halcrosia has the square head and elongated cervical shield formed of single pairs of scutella, and the bony eyelids of the Alligators with bony eyelids; but it is a Crocodile, and there are two bones in the eyelid instead of one as in *Caiman palpebrosus*.

The skull of the *Alligator palpebrosus* is easily known from that of this species, even in the young, by the cheeks of the former being flattened and nearly erect, and of the latter spread out, and in the supratemporal fossæ being open, while in the Alligator they are closed even in the young specimens. Most probably it was from an examination of a skull of this Crocodile that the statement has arisen that in some Alligators the canine teeth sometimes fit into a notch in the upper jaw, and not into a pit as they normally do in that genus. I will not undertake to say that such an abnormal state does not exist in the genus *Alligator*; but I have not observed it.

1. Halerosia nigra. (Black African Crocodile.)

(Figs. 10–13.)

Krokodile noir du Niger, *Adanson, MS., Mus. Paris* (see *Cuvier, Oss. Foss.* iii. p. 41).
African Black Crocodile, *Gray, Rep. Brit. Ass.* 1862, *Sect.* p. 107.
Crocodilus niger, *Latr. Hist. Nat. Rept.* i. p. 510 (from *Adanson*).
Crocodilus palpebrosus, var. 2, *Cuvier, Oss. Foss.* iii. p. 41, t. 2. f. 6 (part.).
Crocodilus trigonatus (part.), *Cuvier, Oss. Foss.* iii. p. 65.
Osteolæmus tetraspis, *Cope, Proc. Acad. Nat. Sci. Philad.* xii. p. 550.
Crocodilus frontatus, *A. Murray, P. Z. S.* 1862, pp. 139, 213, fig. head, t. 29, by Ford.
Strauch, Syn. Croc. t. 1 (head, young).
Halerosia frontata, *Gray, Ann. & Mag. Nat. Hist.* 3rd ser. x. p. 277.
Halerosia nigra, *Gray, Trans. Zool. Soc.* 1869, vi. p. 153.
Halerosia Afzelii, *Lilljeborg, P. Z. S.* 1867, p. 715.

Hab. West Africa: Senegal (*Adanson*); Gaboon; Old Calabar; Ogobai River (*Cope*).

Black, slightly mottled with pale whitish. Head pale olive, black-dotted; sides of lower jaw black-banded; muzzle broad, oblong, trigonal, rather dilated on the sides; forehead high, broad, flat, with a small tubercle at the front angle of the orbit. Nuchal shields strongly keeled, two in a cross line in two groups. Cervical shields six, in three pairs, all close together; the two anterior pairs of equal size, large, strongly keeled, and bent in on the outer sides; the hinder pairs much smaller. The vertebral series of dorsal shields broad, square, scarcely keeled, with one, and in the front of the back two rows of oval, elongated, keeled shields on the side of them, and a few isolated, scattered, compressed, high, tubercular-like small ovate shields on the sides of the body. Shields of the upper arm oblong, trigonal, keeled, in six oblique cross series. The lines of the upper jaw sinuous, three-parted; the front with five, the second with seven, and the hinder with five teeth.

The largest specimen I have seen is in the Free Museum at Liverpool, and is nearly five feet long; but I have no doubt it grows larger. The muzzle of this specimen from the tip of the nose to the orbit is $3\frac{1}{2}$ inches, its width in front of the orbit $2\frac{1}{2}$ inches, and at the notch of the canine teeth $1\frac{1}{2}$ inch. The eyelid is obliquely divided from the front of the orbit to the back of the eye.

The Black African Crocodiles appear to be a common species on the west coast of Africa; for they are often brought to the port of Liverpool by the palm-oil ships, and frequently in a living state; indeed I am informed that there were some lately alive in the Society's Gardens in the Regent's Park.

Mr. Andrew Murray, at my recommendation, has described it in the 'Proceedings' of the Society as a new species of Crocodile under the name of *C. frontatus*; for at that instant it did not occur to me that it might be the Black Crocodile of Adanson, noticed as an *Alligator*. It is to be observed that, although they have specimens of this Crocodile in the Paris Museum in such abundance as to part with the skeleton of it as a duplicate, it is not included as *Alligator palpebrosus*, or under any name, in M. Auguste Duméril's List of the Reptiles of West Africa, printed in the last volume of the 'Archives du Muséum' of Paris.

This Crocodile has very much the external appearance of the Caiman with bony eyelids, *Crocodilus palpebrosus*, Cuvier; and I think it very likely that Cuvier mistook a specimen of it in the Paris Museum, which Adanson had marked with his own hand "*Krokodile noir du Niger*," for a specimen of that species (see Cuvier, Oss. Foss. iii. p. 41); and it is still confounded with that species by the French naturalists; for there is a specimen in the British Museum, lately sent from M. Braconier, of the French Museum, under the name of *Caiman à paupières osseuses*.

Adanson, in his 'Voyage to Senegal,' at p. 10, mentions the occurrence of Crocodiles, and at p. 73 a second kind of Crocodile, which is as large as the other, and distinguished by the black colour and by the jaws being much more elongated. It is more carnivorous, and said to be fond of human flesh.

Cuvier, in his essay on the species of existing Crocodiles, first published in the 10th volume of the 'Annales du Muséum,' and reprinted in his 'Ossemens Fossiles,' under the head of *Le Caiman à paupières osseuses* (*Crocodilus palpebrosus*, nob.), after dividing this species into two varieties, expressed a doubt if they were not inhabitants of different continents. He observes, "One of my individuals, which has been for many years in the museum, has on it the half-effaced name of *Krokodile noir du Niger* in the handwriting of Adanson,"—and proceeds thus:—"This naturalist, in his 'Voyage,' speaks of two Crocodiles in the Senegal. M. de Beauvois adds that he saw at Guinea a *Crocodile* and a *Caiman*. It is therefore clear that there is a species with the form of a *Caiman* that inhabits Africa.

"There remains still an embarrassment. Adanson says his *Black Crocodile* has the muzzle longer than the *Green*, which is certainly the same as the *Crocodile of the Nile*; but we have a specimen ticketed by his own hand which has a much shorter muzzle than that from Egypt.

"Has Adanson made a mistake in writing this phrase?

or has he erroneously ticketed the specimen? How are we to disentangle these errors?" &c. (vol. v. p. 41).

Duméril & Bibron, in their 'Erpétologie Générale' (vol. iii. p. 75), adopt and repeat all that Cuvier has said, and still doubt if these two varieties may not be found, the one in America, the other in Africa.

If Cuvier and his successors had examined the two specimens on which they founded the account of his second variety of *C. palpebrosus*, they would have found that they were not only distinct species, but also species belonging to two genera or subgenera. The one which had served as the model for Seba, and which Seba, with the usual inattention to true habitats at that period, said came from Ceylon, was a true *Alligator* and a native of America; and the other, ticketed by Adanson as from the Niger, was really a Crocodile from Africa: so that the sarcastic observation which he made on travellers, and which may in some cases be true, was in this instance uncalled for, the traveller being in fact more accurate than the cabinet naturalist; and Adanson only made a slip of the pen in saying that the beak was *longer* instead of *shorter* than the common Green Crocodile; and any one who compares the Black Crocodile of Africa with an American Caiman will not think M. Beauvois was very much out when he called it a "Caiman."

Cuvier, in his Essay, when describing *Crocodilus biscutatus*, established on the *Gavial du Sénégal* of Adanson, again refers to the *Crocodile noir* of that author. He states that among the drawings of Adanson there is a figure of a *Crocodilus vulgaris* named *Crocodile noir*, and a *Caiman à paupières osseuses* inscribed the *Crocodile vert*. This must evidently have been an inadvertence, like the length of the nose; but, as Cuvier observed, this is pardonable, as Adanson most probably named these drawings after he had forgotten them, and had been studying other things, long after his voyage, which occupied some of the first years of his youth. (See Cuvier, Oss. Foss. iii. p. 53.)

A Caiman, in some of its characters, but which is nevertheless a true Crocodile, with the canines fitting into a notch and not into a pit in the upper jaw, is, there cannot be a doubt, the Crocodile that Adanson referred to; for it agrees with his description in its colour and in its ferocious habits. And further, that it is the Crocodile that the French naturalists refer to, is proved by the fact, already recorded, that we have received from one of the persons employed by M. Duméril at the Paris Museum a skeleton of a young specimen of the Black Crocodile of West Africa as the skeleton of the American *Alligator palpebrosus* of Cuvier.

Dr. Strauch refuses to believe that "Le Crocodile noir" of Adanson is the *Crocodilus frontatus*, which is universally known as the Black Crocodile in West Africa, where *Crocodilus cataphractus* is called a Gavial (see Zool. Rec. 1866, p. 122). He afterwards gives in detail the reasons why he refers Adanson's "Crocodile noir" to *C. cataphractus* and not to *C. frontatus*, and states that Adanson's "Gavial du Sénégal," which is the *C. biscutatus*, Cuvier, is in fact an American species and identical with *C. acutus* (Bull. Ac. Sc. St. Pétersb. xiii. p. 51, or Mélang. Biol. vi. p. 622; Zool. Rec. 1868, p. 120). These observations are a good example of the mistakes an industrious compiler may fall into. He forgets that Adanson wrote in Senegal about Senegal animals, and was not likely to describe or figure an American species. The best way to explain his descriptions is to compare them with West-African specimens, and with the names given to them by the inhabitants.

B. *Face very long, slender; nasal not reaching to the nostril.* Gavialoid Crocodiles.

7. MECISTOPS.

Face subcylindrical, scarcely dilated in the middle; orbits simple. Nuchal shields numerous, small, in two cross series. Cervical disk narrow, containing two or three pairs of plates. Dorsal plates small, all keeled, in six longitudinal series, lateral one narrowest. Intermaxillary produced behind, and embracing the front end of the nasal.

Mecistops, *Gray, Ann. & Mag. Nat. Hist.* 3rd series, x. p. 273; *Cat. Tort. & Croc. B. M.* p. 58; *Trans. Zool. Soc.* 1869, vi. p. 156.
Huxley, Proc. Linn. Soc. iv. p. 15, 1859.

This genus has some resemblance to the Gavials; but the structure of the skull and the position of the teeth are those of a true Crocodile.

Professor Owen observes, "There is, however, a very close resemblance in the elongate, slender proportion of the skull, and the elongated festooned border of the jaws, between this species and the *Crocodilus Schlegelii* from Borneo."—*Loc. cit.* p. 158. The *Crocodilus Schlegelii* is a Gavial.

Dr. Falconer observes, "The nasal bones (in *Mecistops*) are extremely narrow and attenuated; but, as in the true Crocodiles, they descend between the maxillaries so as to project into a notch between the intermaxillaries. The

Fig. 14.

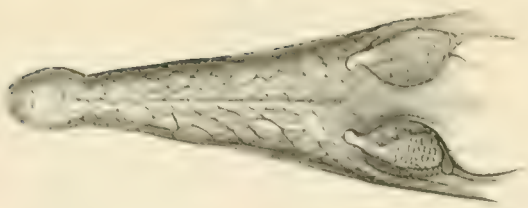


Fig. 16.

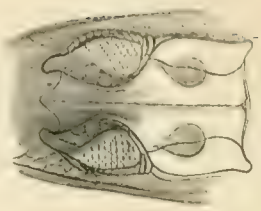


Fig. 15.

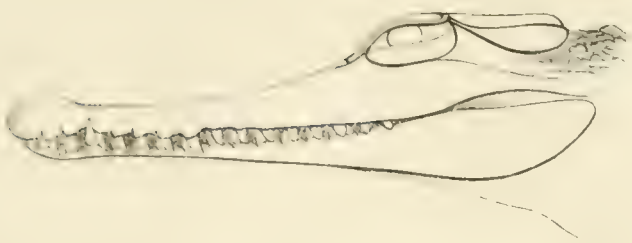
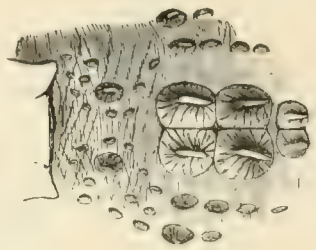


Fig. 17.



Mecistops cataphractus, young. Head and nuchal and cervical shields.

same holds good in *C. Schlegelii*, where, as with the Gavials, the nasal terminates a short way in front of the orbits, and does not enter into the formation of the anterior portion of the beak" (p. 363). "This character is a good diagnostic mark between the Crocodile proper and the Gavial, separating *C. Schlegelii* from the latter genus, under which Müller ranged it" (p. 363).

Dr. Balfour Baikie states, "In all essentials the skull of the *Mecistops* shows it to be properly classed as a member of the family Crocodilidæ rather than the Gavialidæ. The teeth are irregular, the sides of the jaw not parallel; there is a distinct swelling opposite the ninth remaining upper molar, and the lower canines are received into notches in the upper jaw."—*P. Z. S.* 1857, p. 58.

1. Mecistops cataphractus. (African False Gavial.) (Figs. 14–17.)

Crocodilus biscutatus, *Cuvier, Oss. Foss.* iii. pp. 52, 65, t. 5 (very young).
Crocodilus bisulcatus, *Bory, Dict. Class. H. N.* v. p. 108 (misprint).
Crocodilus cataphractus (Crocodile à nuque cuirassée), *Cuvier, Oss. Foss.* v. t. 5. f. 1, 2 [copied, *A. Dum. Arch. du Mus.* x. t. 14. fig. 2].
Dum. & Bibr. E. G. iii. p. 126 (young).
Bennett, Proc. Zool. Soc. 1834, p. 110.
Owen, Cat. Osteol. Spec. Mus. Coll. Surg. p. 155. n. 710 (Cuvier's type).
The Crocodile, *Bowdich, Madeira*, p. 232.
Crocodilus leptorhynchus, *Bennett, P. Z. S.* 1835, p. 129.
A. Dum. Arch. du Mus. x. p. 252, & i. p. 171, t. 14. f. 1.
Mecistops cataphractus, *Gray, Cat. B. M.* p. 58; *Trans. Zool. Soc.* 1869, vi. p. 157.
Mecistops Bennettii, *Gray, Cat. B. M.* p. 57.
Gavial of Senegal, *Gray, Rep. Brit. Assoc.* 1862, *Sect.* p. 107.
Mecistops, *Balfour Baikie, P. Z. S.* 1857, p. 58.

Hab. West and Central Africa: ? Fernando Po (*Bennett*); Gaboon, Lagos. Central Africa, river Binuë (*Baikie*).

The species has been described from small young specimens. It grows to a large size. There is an imperfect specimen which is scarcely adult, in the British Museum, that was sent from Fernando Po by Capt. R. F. Burton, which must have been 13 or 14 feet long. Unfortunately it wants the head; the body is 5 feet, and the tail 8½ feet long.

The specimen originally sent by Mr. Bennett was said to have come from Fernando Po; but Dr. Balfour Baikie observes that Fernando Po is a small volcanic island, totally without the muddy rivers delighted in by Crocodiles, and possessing nothing but streams (which during the rainy season are tumultuous mountain-torrents) with rocky beds. —*P. Z. S.* 1857, p. 58.

Most probably Mr. Bennett's specimen came from the coast, and was only received through agents at Fernando Po.

Cuvier, in his essay, described, under the name of *Croco-*

dilus biscutatus, and figured the nuchal shields at t. 2. f. 6, a species of Crocodile founded on a specimen in the French Museum which is labelled in Adanson's handwriting "*Gavial du Sénégal*," and also on a very mutilated stuffed specimen which Cuvier found in the Museum of the Academy of Sciences at Paris (see Oss. Foss. v. pp. 53, 65, t. 2. f. 6). He observes, "The colour of these specimens is scarcely darker than that of the common Crocodile; therefore it cannot be the Black Crocodile of Adanson." And he further specially remarks that "the jaws are a little longer and narrower than those of *C. vulgaris*, but not so long and slender as those of *C. acutus*." It resembles the latter in the dorsal shield of the vertebral line being only slightly keeled; but its peculiar character is that the middle of its nape is armed with two large pyramidal shields, and with two smaller ones in front of them.

This Crocodile has been a paradox until this time. MM. Duméril and Bibron regarded this mutilated specimen as only a specimen of the American Crocodile (*C. americanus*) with an anomalous development of the cervical and nuchal shields, observing that the specimens of this species are liable to variation in this respect; but yet they do not describe any as exactly resembling Cuvier's description or figure.

It does not appear that the specimen labelled by Adanson came under the examination of these naturalists; at least I cannot find any reference to it in their work. Cuvier, unfortunately, does not state its size; but I have a strong opinion that it must have been a very young specimen of *Mecistops cataphractus*, before its elongated jaws were developed, and that the name of *Gavial du Sénégal* was very applicable to it. The back is grooved by the flatness of the vertebral series of shields, as described by Cuvier, and as is characteristic of the American Crocodile (*C. acutus*) with which MM. Duméril and Bibron compared it. But this is a question which can only be solved by the examination of the original specimens.

Cuvier, in his Essay (vol. v. p. 58), observes, "When in England in 1818, I saw at the Museum of the College of Surgeons a dried specimen of a Crocodile." This he describes and figures under the name of "*Crocodile à nuque cuirassée*" (*Crocodilus cataphractus*, nob.).

In 1834 Mr. Edward Turner Bennett (P. Z. S. ii. p. 10) gave a notice of a specimen of *Crocodilus cataphractus* of Cuvier being alive in the gardens of the Zoological Society. At the Meeting of the Society on the 22nd September, 1835 (P. Z. S. iii. p. 129), after the animal had died, on more close examination he described this animal as a new species, under the name of *Crocodilus leptorhynchus*; and Mr. Martin added some notes on its internal anatomy.

It is to be observed that Mr. Bennett and I were misled on this occasion by the erroneous breadth given to the animal in the figure published by Cuvier; for he speaks of the length of the head being to its breadth as 3 to 1, instead of $2\frac{1}{2}$ to 1.

In the Catalogue of the Tortoises, Crocodiles, and Amphibians in the Collection of the British Museum, published in 1844, I formed a genus under the name of *Mecistops* for this animal, and for the first time described a full-grown specimen of it, which we had received from the Gambia as *Mecistops Bennettii*; for M. Rendal considered it distinct from Cuvier's animal, but observed that they might be varieties. This might all have been avoided if we could have seen the original specimen; but when I inquired for it, it could not be found.

The specimen described and figured by Cuvier is fortunately now to be seen in the Museum of the College of Surgeons, referred to under No. 710 in the Catalogue of Osteological Specimens in that collection. It is a young dried specimen of the Crocodile which is now so frequently brought from the west coast of Africa; and it affords no ground for the supposition of M. Duméril, expressed in his paper "On the Reptiles of Western Africa" (Arch. du Mus. v. p. 252), that these may be distinct species; and it shows that the figure of Cuvier, though characteristic, is not very carefully drawn, and that any difference that may appear results from want of accuracy in the figure, and is not to be found in the animal itself,—supporting the opinion that I expressed in my paper in the 'Ann. & Mag. Nat. Hist.' ser. 3, x. p. 274.

M. Auguste Duméril, in his paper "On the Reptiles of Western Africa" (Archiv du Mus. x. p. 271), gives a good figure of a half-grown specimen of this species under the name of *Crocodilus leptorhynchus*, t. 14, and places by the side of it a tracing of Cuvier's figure of *Crocodilus cataphractus* to show that they cannot be alike; but the comparison of the specimens on which these species were founded shows how much better it is to refer to nature than to depend on figures and descriptions, which are liable to the imperfection attending human observation and record.

Dr. Falconer, in the 'Annals and Magazine of Natural History' for 1846 (xviii. p. 362, t. 6), described and figured a skull of this species under Cuvier's name, which was in the Belfast Museum, and said to have been sent from Sierra Leone.

Dr. Balfour Baikie described the skull of a specimen from the river Binuë (see P. Z. S. 1857, p. 58).

Fam. III. ALLIGATORIDÆ.

The upper and eleventh lower teeth longer, like canines, the canines of the lower jaw fitting into holes or perforations on the edge of the upper jaw.

Alligatoridæ, *Gray, Cat. Tort. &c. B. M.* p. 56, 1844; *Trans. Zool. Soc.* 1869, vi. p. 160.
Huxley, Journ. Proc. Linn. Soc. iv. p. 3.
Alligator, *Cuvier.*
Gray, Ann. Phil. x. p. 195.

Teeth strong, unequal, the hinder ones differ in shape from the anterior. The front pair of mandibular teeth and the fourth pair (canines) are received into pits on the edge of the præmaxilla and maxillæ. The mandibular teeth behind these pass inside and not between the maxillary teeth. The premaxillo-maxillary suture on the palate is straight or convex forwards. The symphysis of the lower jaw is short.

Spix, in his work on Brazilian Lizards, gives very good figures of the Alligators, with the colours well marked. The memoir on South-American Alligators by Natterer contains very accurate and detailed figures of the head and the neck-shield of the different species. He has figured some varieties or species very nearly allied to those here noticed, which have not come under my observation.

Spix divided the Alligators into two genera:—*Jacaretinga*, with acute nose (1. *J. moschifer*, t. 1=*Caiman palpebrosus*, p. 161; 2. *J. punctulatus*, t. 2=*Jacare punctulata*, p. 159); and *Caiman* or *Jacare*, with blunt nose (including 1. *C. niger*, t. 4=*Jacare nigra*, p. 167; 2. *C. fissipes*=*Jacare latirostris*, p. 167).

His figures are very good representations of the species—indeed the best known.

MM. Duméril and Bibron admit the three species described and figured by Spix, thus:—

1. *A. sclerops*, p. 74 (*Caiman noir*, Spix, Bras. t. 4).—Head elongate, flattened; a ridge in front of each eye; upper eyelid *finely* striated. *Nape with two rows of small, oval, compressed scales.* Back with two central longitudinal ridges; the three last cross bands of six keeled scales. Black, yellow-banded. I have no specimen agreeing with the account of the nuchal scales and the eyelid of *A. sclerops*: according to Spix the dorsal scales are elongate.

2. *A. cynocephalus*, p. 86 (*Caiman fissipes*, Spix, Bras. t. 3).—Head short, broad, thick; a ridge in front of each eye; the upper eyelid rugose. *Nape with two rows of large, square, keeled shields.* Back scale keeled, the last three cross bands of four scales. Sides with some strongly keeled scales. Back green, black-dotted.

3. *A. punctulatus*, p. 91 (Spix, Bras. t. 2).—Head elongate; nose flattened, with a rounded point in front, *without any preocular ridges*; upper eyelid rugose. Nape with two rows of shields. Back flat, scarcely keeled. Sides with some larger scales. Yellow, black-dotted.

John Natterer, in his 'Beitrag zu den süd-amerikanischen Alligatoren,' edited by Fitzinger, describes eight species of the genus *Champsa*: five have partly bony eyelids, and three have them entirely bony. The five former belong to the genus under consideration.

The preorbital ridge distinct; beak broad, with three lateral foveolæ; eyelid striated; beak broad and blunt: *C. nigra*, t. 21.

The nuchal scutella many, in three series: *C. fissipes*, t. 22.

The nuchal scutella many, in two series: *C. sclerops*, t. 23.

The preorbital ridge evanescent; beak without lateral foveolæ; eyelids rugose; the frontal ridge flexuous, bent in front: *C. vallifrons*, t. 24.

The frontal ridge arched, bent back: *C. punctulata*, t. 25.

M. Natterer gives the following proportional measurements of the heads:—

	Length of head.	Width of head.	Width of crown before.	Width of crown behind.	Width of beak above 8th tooth.
	in. l.	in. l.	in. l.	in. l.	in. l.
Champsa nigra	16 0	8 0	3 6	4 9	5 1
—— *fissipes*	10 3	6 5	2 7	3 5	4 0
—— *sclerops*	6 6	5 8	2 8	3 3	3 3
—— *vallifrons*	7 10	4 6	2 0	2 9	2 3
—— *punctulata*	10 5	5 4	2 5	3 2	2 5

The figures of the heads of the last two species differ from that of *C. sclerops* chiefly in the nose being narrower (*C. punctulata* being the narrowest and very slender), narrower than in any specimen that has come under my observation; the lower jaws in the figure also differ in shape, that of *C. vallifrons* being the most slender. Dr. Strauch, who had M. Natterer's specimens to examine, regards the two latter as the same species, but distinct from *sclerops*.

Synopsis of the Genera.

I. *The ventral scutella like the dorsal ones, bony and articulated together, forming a shield. The eyelids with an internal bony plate. The cervical scutella in pairs, forming an elongated shield. Nasal bone short.* Tropical America.

1. **Jacare.** The orbits united by a bony cross ridge. Eyelids partly striated or rugose.

2. **Caiman.** The orbits not united by a cross ridge. Eyelids bony, entirely smooth.

II. *The ventral scutella thin; the dorsal scutella bony, not articulated together. The eyelids fleshy, smooth. The cervical scutella in pairs, separate. Nasal bone elongate, separating the nostrils.* North America.

3. **Alligator.** The face broad, depressed.

Section I. *The ventral scutella like the dorsal ones, bony and articulated together, forming a shield. The eyelids with an internal bony plate. The cervical scutella in pairs, forming an elongated shield. Nasal bone short.* Tropical America.

1. JACARE.

Head moderately high, shelving on the sides. Orbits united by a distinct bony cross ridge. Eyelids striated or rugose, strengthened by a small internal bone. The cervical scutella four or five pairs, forming a shield; the dorsal and ventral scutella both consolidated together, forming a dorsal and ventral shield; the gular and ventral plates smooth.

Jacare, *Gray, Cat. Tort. & Croc. B. M.* p. 64, 1844; *Ann. & Mag. Nat. Hist.* 3rd ser. x. p. 327, 1862; *Trans. Zool. Soc.* 1869, vi. p. 162.
Huxley, Proc. Linn. Soc. 1859, p. 4.
Jacaretinga, *Spix, Lacert.*
Pelosuchus, *Cope, Proc. Acad. Nat. Sci. Philad.* 1868, p. 203.

The pits in the maxilla are the cavities left by the preorbital ridges as they advance. The intermaxillary bone short, truncated behind, with an elongate-oval or lanceolate cavity between this and the front of the palate.

The figures of Natterer are excellent to general appearance, but they do not agree with the measurements of our specimen; that is to say, the nose of *Champsa fissipes*, from the ridge, is about the same length as the forehead; but in his figure it is represented as larger, and it is so in all the other figures: perhaps this is to allow for the perspective.

A. *Head elongate; interorbital ridges strong. Dorsal scutella elongate, keeled; keels of vertebral series highest. Lumbar scutella in six longitudinal series; nuchal scutella small, compressed. Eyelids striated, with a rather large internal bone. Back black, varied with yellow.*

Melanosuchus, *Gray, Ann. & Mag. Nat. Hist.* x. p. 328.

1. Jacare nigra. (Black Jacaré.)

Crocodilus sclerops, *Schn. Amph.* p. 162.
Blainv. Ostéogr. Croc. t. 3. f. 2, t. 4. f. 13.
Crocodilus yakare, *Daud.*
Alligator sclerops, *Cuvier, Oss. Foss.* v. p. 35, t. 1. f. 6 & 7, t. 2. f. 3.
Brühl, Skelet. Krokod. t. 12. f. 3, 5, 6, 7, t. 19. f. 21.
Alligator sclerops, var., *Gray, Syn. Rept.*
Caiman niger, *Spix, Bras.* t. 4 (good).
Champsa nigra, *Natterer, Beitr.* t. 21 (good).
Alligator niger, *Owen, Cat. Osteol. Spec. Mus. Coll. Surg.* p. 704. n. 166 (adult).
Jacare nigra, *Gray, Cat. Tort. & Croc.* p. 65; *Ann. & Mag. Nat. Hist.* x. p. 328, 1862; *Trans. Zool. Soc.* 1869, vi. p. 163.

Hab. Para, 13 feet long (*Graham*); Guiana (*Owen*).

I think it better to adopt Spix's name, as *sclerops* has been used for all the species.

B. *Head short; orbits with diverging ribs in front to edge of jaw. Dorsal scutella broad, slightly keeled, equal; the lumbar scutella in four longitudinal series; nuchal scutella distinct, in two cross series. Eyelids rugose, with a small internal bone. Back olive, banded with brown.*

Cynosuchus, *Gray, Ann. & Mag. Nat. Hist.* 1862, x. p. 328.

In many of the specimens the first scale of the nuchal shield has two keels, in others only one; but in several specimens the scale has two keels on one side and only one on the other.

a. *Head short, broad, depressed, with very distinct preorbital ridges to the edge of the jaw. Cervical disk short, broad, formed of four bands of scutella. Sides of jaws pale, with a series of dark spots.*

2. Jacare latirostris. (Dog-headed Jacaré.) B.M.

Dorsal shields in eight longitudinal series, four on each side. Ventral shields in twelve series.

Crocodilus latirostris *and* C. yacare, *Daud. Rept.* ii. pp. 407, 417.
Caiman fissipes, *Spix, Bras.* t. 3 (good).
Champsa fissipes, *Wagner, Icon.* t. 17.
Natterer, Beitr. t. 22 (good).
Crocodilus sclerops, *Wied. Abbild.* t. .
Blainv. Ostéogr. Crocod. t. 3. f. 2, t. 4. f. 13.
Schinz, Rept. t. 112.
Jacare fissipes, *Gray, Cat. Tortoises B. M.* p. 64.
Alligator sclerops, *Pr. Max. Abbild.* t. .
Alligator cynocephalus, *Dum. & Bibr. Erp. Gén.* ii. p. 86.
Alligator latirostris, *Hensel, Wiegm. Arch.* 1868, p. 348.

Jacare latirostris, *Gray, Ann. & Mag. Nat. Hist.* 1862, x. p. 328; *Trans. Zool. Soc.* 1869, vi. p. 163.

Hab. Brazil, Pernambuco (*J. P. G. Smith*); Surinam.

The nose of the young specimen is as long as the width at the eighth tooth. The nose from the ridges nearly as long as the back of the head; width of the muzzle at the notch one-half the length of the head.

Var. 1 (three young in spirit). Head short; sides of face pale, with a dark spot under each ear and another larger under each eye. The lower jaw pale; five round spots on each side, the middle one, under the eyes, the largest. Beak black, with interrupted or irregular pale brown cross bars.

Hab. Pernambuco (*J. P. G. Smith*).

The smaller specimen is peculiar for the very small size of the ventral shield in front of the vent. The spots on the side of the face and lower jaw are to be seen in the older specimens when they are between 3 and 4 feet long.

Var. 2. Head rather larger and narrower. The nose from the ridge rather longer than the back of the head; width of the notch two-fifths the length of the head. Cheek and side of the lower jaw with five large black spots. Ventral shields in twelve series. Dorsal shields four.

Hab. South America; Lake of Santa Cruz de la Sierra.

3. Jacare multiscutata. (Brazilian Jacaré.) B.M.

With sixteen series of ventral shields; hinder ventral shields very narrow; dorsal shields in ten longitudinal series, five on each side.

Hab. Brazil.

A skin in the British Museum (46. 7. 10. 41).

b. *Head elongate, longer than the width at the eighth tooth, with none or only indistinct evanescent ridges from the front of the orbit. Cervical disk oblong, elongate, of five series of scutella.*

* *Face depressed, broad; sides of the jaws with a series of large coloured spots.*

4. Jacare longiscutata. (Long-shielded Jacaré.) B.M.

Dorsal scutella elongate, longer than broad, uniformly keeled, in ten longitudinal series on the middle of the body; ventral scutella elongate, in fourteen or sixteen longitudinal series; sides of the jaws pale, with five or six band-like spots; the inner pairs of the first and second series of cervical scutella large and equal-sized.

Jacare longiscutata, *Gray, Ann. & Mag. Nat. Hist.* 1862, x. p. 328; *Trans. Zool. Soc.* 1869, vi. p. 164.

Hab. South America (Brit. Mus.).

This is very like the following; but the head is rather broader, and the dorsal and ventral shields are much larger and more numerous.

It is known from the young of *Jacare nigra* by its olive colour, the spots on the sides of the jaws, and the presence of the distinct nuchal scutella.

5. Jacare ocellata. (Eyed Jacaré.) B.M.

Dorsal scutella broad, uniformly keeled, in eight longitudinal series in the middle of the body; ventral scutella in twelve longitudinal series, the hinder ones smaller, larger, and more numerous; the central pair of cervical scutella in the first series smaller than those that follow.

Jacare ocellata, *Gray, Ann. & Mag. Nat. Hist.* x. p. 329, 1862; *Trans. Zool. Soc.* 1869, vi. p. 164.

Hab. Lake of Santa Cruz de la Sierra (Brit. Mus.).

** *Face attenuated, rather high on the sides; sides of the jaws one-coloured.*

6. Jacare punctulata. (Dotted-jawed Jacaré.) B.M.

Back yellow, banded with brown; the sides of the head yellow; upper and lower jaws yellow, one-coloured, or minutely speckled; sides of the neck smooth, with flat scales: nose rather high and square.

Jacare sclerops, *Gray, Cat. Tortoises B. M.* p. 64.
Crocodilus sclerops, *Schn. Amph.* p. 162.
Cuvier, Ann. Mus. & Oss. Foss. v. t. 1. f. 6 & 7, t. 2. f. 3.
Tiedem. Amph. p. 60, t. 5.
Guérin, Icon. t. 2. f. 2 & 10.
Gray, Syn. Rept. p. 62.
Dum. & Bibr. Erp. Gén. iii. p. 79.
Burm. Gavial. t. 1. f. 5 & 8, t. 3. f. 1 (head).
Crocodilus americanus, *Laur. from Seba*, t. 104. f. 10.
Crocodilus caiman, *Daud. Rept.* iii. p. 394.
Caiman (Jacaretinga) punctulatus, *Spix, Bras.* t. 2 (good).
Champsa sclerops, *Wagner, Syst.* t. 7. f. 1, 2, & f. 42.
Natterer, Beitr. t. 22 (heads good).
Alligator punctulatus, *Dum. & Bibr. Erp. Gén.* ii. p. 91.

Jacare punctulata, *Gray, Ann. & Mag. Nat. Hist.* 1862, x. p. 329 ; *Trans. Zool. Soc.* 1869, vi. p. 165.

Hab. Brazil (*Spix*) ; Surinam ; Argentine Republic (*H. Christy*).

Natterer figures two other species, under the name of *Champsa vallifrons* (t. 24) (*Jacare vallifrons*, Gray, Cat. B. M. p. 65), and *Ch. punctulata* (t. 25) (*Jacare punctulata*, Gray, Cat. B. M. p. 65), which seem to differ from the former in the head being narrower and more tapering. I have seen no specimens agreeing with these figures; but they look very like varieties of the above. At the same time some of our specimens appear to have a more attenuated snout than others; but when you apply the callipers to the nose and to the other parts of the head, the absolute proportions of the parts are very nearly the same.

A stuffed specimen from the Argentine Republic measures 6 feet 9 inches long ; the head from the occiput is $10\frac{1}{2}$, and the nose from the ridge $6\frac{1}{2}$ inches. In another, from the Zoological Society's Gardens, 5 feet 10 inches long, the head from the occiput is 10 inches, the nose from the ridge $6\frac{1}{2}$ inches long. A series of young specimens in spirits are pale brown; the back and tail with narrow brown cross bands, those on the back sometimes broken into square spots; the cheek and outside of lower jaw pale yellow, without spots; the sides of the nuchal disk dark-coloured.

Alligator lacordairei, *Prudh. de Borre, Bull. Ac. Belg.* xxviii. 1869, p. 109, t. .

Hab. British Honduras (*Prudhomme*).

From a young specimen in the Museum of Brussels, and very difficult to determine from his figure. He considers it nearest to *Alligator* (*Jacaretinga*) *punctulatus*, Spix; but it is too young to determine.

7. Jacare hirticollis. (Rough-necked Jacaré.) B.M.

The scales on the sides of the neck rough, spinulose, pale yellow; back and tail brown, cross-barred; cheek and sides of the lower jaw yellow, not spotted.

Hab. Demerara (Brit. Mus.).

I may observe that, characteristic as are the figures of Dr. Natterer's paper, none of them exactly agrees in measurements with the specimens in the British Museum.

In some specimens of the *Jacare* the first and sometimes even the second cervical scutella have two keels, in others only one; but this is no specific distinction; it is not rare to find species with two keels on one side of the neck and only one on the other.

Mr. Cope describes the genus *Perosuchus*, and thus characterizes it: "Toes 5–4, with claws 2–3; no osseous nasal septum or bony eyelid; belly protected by a series of osseous plates as well as the back."

Perosuchus fuscus, *Cope* (from New Granada), *Proc. Acad. Nat. Sci. Philad.* 1868, p. 203.

I do not see how this differs from *Jacare*.

2. CAIMAN.

Head high, flattened on the sides, angulated above. Orbits without any ridges. The eyelids smooth, strengthened with a large, single, internal bony plate. The dorsal and ventral scutella bony, articulated together, forming a dorsal and ventral shield; the gular and lateral ventral plates keeled, the abdominal ones smooth; the cervical scutella four or five pairs, with sometimes one or a pair interposed between the second and third pairs.

Skull with the superior temporal fossæ obliterated, the circumjacent bones uniting; the eyelid with a single large bony plate covering the whole upper surface; vomer not apparent on the palate.

Caiman, *Gray, Cat. Tort. &c. B. M.* p. 66, 1844; *Ann. & Mag. N. H.* 1862, x. p. 330; *Trans. Zool. Soc.* 1869, vi. p. 166.
Huxley, Proc. Linn. Soc. iv. p. 3.

This genus has been divided into two species—one having the cervical shields two, and the other four in a cross series; in all the latter there are two in a cross series, with one or two interpolated between the other shields.

I have seen no specimen which agrees in the nuchal shields with either of the figures in Cuvier, Oss. Foss., though our two species agree in other respects with his figures; and how such species with distinct organic characters could be regarded as varieties I am unable to learn.

I cannot conceive what induced M. Cuvier in his 'Essay' to consider the two South-American Alligators with bony eyelids varieties; for he justly observes, "The Crocodile of St. Domingo is not more distinct from the Crocodile of the Nile than these two varieties are from each other."

In the Latin synopsis of the species, which is appended to the paper, they are regarded as distinct, and the second one is called *C. trigonatus*. Yet MM. Duméril and Bibron in their work persist in following Cuvier's first idea of their being only varieties, and in regarding Adanson's specimens

as belonging to the second variety, and also in doubting if the "two varieties" are both from America.

The specimen in the British Museum proves most distinctly that there are two very distinct Alligators with bony eyelids found in Tropical America; which agrees well with the character that M. Cuvier and MM. Duméril and Bibron give to the two varieties of that species; and these species are, as Cuvier observes, as distinct from one another as *C. americanus* from *C. vulgaris*. The heads of both these species are figured by Dr. John Natterer in his "Essay on American Alligators" in the Vienna 'Transactions.' This author also figured a third species, which he calls *A. gibbiceps*, which, if it is separable from *A. trigonatus*, must be distinguishable from it by very slight characters.

The Black Crocodile (*Halerosia palpebrosa*) of West Africa has so much resemblance to this animal that Cuvier considered Adanson's West-African specimen a variety of this species.

Duméril and Bibron evidently considered the African and American animals the same species; and we a short time ago received from M. Braconier, of the Jardin des Plantes, a skeleton of the African species *Halerosia nigra* under the name of *Alligator palpebrosus*, var.

A. *Head shelving on the sides. Nuchal scutella in a single cross series; cervical scutella five pairs; dorsal scutella highly keeled, irregular, in six series; the lumbar scutella in two longitudinal series; the gular and two outer lateral series of ventral scutella keeled. The flat upper disk at the base of the tail broad and strongly crested.*

Paleosuchus, *Gray, Ann. & Mag. Nat. Hist.* 1862, x. p. 330.

1. Caiman trigonatus. (Rough-backed Alligator.) B.M.

Crocodilus trigonatus, *Schn. Amph.* p. 151, vi.
Tiedemann, Amph. p. 66, t. 67.
Crocodilus palpebrosus, var. 2, *Cuvier, Oss. Foss.* v. p. 40, t. 2. f. 1.
Caiman trigonatus, *Gray, Cat. Tort. &c. B. M.* p. 66; *Ann. & Mag. Nat. Hist.* x. p. 330, 1862; *Trans. Zool. Soc.* vi. p. 167, 1869.
Alligator palpebrosus, *Brühl, Skelet. Kroc.* t. 19. f. 3.
Champsa trigonata, *Natterer, Beitr.* t. 26 (good).

Hab. Tropical America.

The largest specimen in the British Museum is rather above 4 feet long. The young specimens have the lateral ventral shields keeled.

B. *Head flat, and erect on the sides. Nuchal scutella many, in two cross series; cervical scutella three pairs; dorsal scutella slightly keeled; the lumbar scutella in four longitudinal series; the gular, the ventral, and the lateral abdominal scutella keeled. The flat upper disk at the base of the tail elongate.*

Aromosuchus, *Gray, Ann. & Mag. Nat. Hist.* x. p. 330.

2. Caiman palpebrosus. (Banded Alligator.) B.M.

Brown; tail black-banded.

Crocodilus palpebrosus, var., *Cuvier, Oss. Foss.* v. t. 1. f. 6–17, and t. 2. f. 3.
Champsa palpebrosa, *Natterer, Beitr.* t. 27 (good).
Caiman (Jacaretinga) moschifer, *Spix, Bras.* t. 1 (skull).
Caiman palpebrosus, *Gray, Cat. Tort. &c. B. M.* p. 67; *Ann. & Mag. Nat. Hist.* x. p. 330, 1862; *Trans. Zool. Soc.* 1869, vi. p. 167.
Crocodilus palpebrosus, *Tiedm. Nat. Amph.* t. 6.
Burm. Gavial. t. 1. f. 1, 2, & t. 3. f. 3 (head).
Alligator palpebrosus, *Merrem, Syst.* p. 35.
Gray, Syn. Rept. p. 63.

Hab. Tropical America.

Natterer figures the head of a species under the name of *C. gibbiceps*; but I do not see how it differs from the above, except that the head is a little higher—perhaps a sexual distinction. Dr. Strauch regards *C. gibbiceps* as the same as *C. palpebrosus*.

Section II. *The ventral scutella thin, the dorsal scutella bony, not articulated together. The eyelids fleshy, smooth. The cervical scutella in pairs, separate. Nasal bone elongate, separating the nostrils.* North America.

3. ALLIGATOR.

Head depressed, broad, without any ridges in front of the orbit. Snout very broad, flattened and rounded at the end, the ninth maxillary tooth the largest. The eyelids smooth, fleshy. The dorsal scutella not articulated together, in six longitudinal series; the ventral scutella thin; the gular and abdominal shields smooth; nuchal scutella one pair, small; cervical scutella three pairs, hinder smallest. Nostril separated by a bony septum. The feet webbed. Dorsal plates in six longitudinal series, the two vertebral closer together. The sides with a short series close to the others, sometimes reduced to only one or two shields.

Alligator, *Gray, Cat. Tort. B. M.* p. 66; *Ann. & Mag. Nat. Hist.* x. p. 330, 1862; *Trans. Zool. Soc.* 1869, vi. p. 168.
Huxley, Proc. Linn. Soc. iv. p. 3.
Champsa, *Wagler, Syst. Amph.* p. 140.

1. Alligator mississippiensis. (Alligator.) B.M.

Alligator, *Catesby, Carol.* t. 63.
Crocodilus mississippensis, *Daud. Rept.* ii. p. 412.
Crocodilus lucius, *Cuvier, Ann. Mus.* x., and *Oss. Foss.* v. t. 1. f. 8, t. 2. f. 4.
Tiedem. Amph. p. 58, t. 4.
Merrem, Zool. p. 34.
Owen, Cat. Osteol. Spec. Coll. Surg. p. 165. n. 760, 761.
Blainv. Ostéogr. Crocod. t. 2. f. 1, t. 5. f. 1.
Brühl, Skelet. Krokod. t. 8. f. 5, 6, t. 9. f. 3, t. 10. f. 3, 4, t. 11. f. 2, 3, t. 20. f.
Burm. Gavial. t. 1. f. 3, 4, & t. 3. f. 4.
Alligator mississippiensis, *Gray, Cat. Tort. &c. B. M.* p. 66; *Ann. & Mag. Nat. Hist.* x. p. 331 (1862); *Trans. Zool. Soc.* 1869, vi. p. 168.
Haughton, Ann. & Mag. Nat. Hist. (1868) i. p. 282, t. 10 (anat.).
Crocodilus Cuvieri, *Leach, Zool. Misc.* ii. p. 117, t. 102.
Alligator lucius, *Merrem, Tent.* p. 34.
Dum. & Bibr. Erp. Gén. iii. p. 75, t. 25, 26.
Alligator Cuvieri, *Bory de St.-Vincent, D. C. H. N.* v. p. 104.

Hab. North America, New Orleans, Texas.

Var. 1. The nose very broad and short. The largest specimen of this variety in the British Museum is nearly 4 feet long.

Var. 2. The nose narrower and longer. The largest specimen in the British Museum is of the same size as the former, which is nearly 4 feet long. Are they the two sexes?

The young specimens in spirit have the back black, with narrow white cross bands. The head pale brown, black-varied. Ventral shields in eight or ten longitudinal rather irregular series.

There is a very young specimen of this species in spirit, from New Orleans, in the British Museum. It is black, with white cross bands. The beak is short, rather slender, with a ridge of skin in front of each eye, giving the appearance of a frontal ridge.

2. Alligator helois.

"Muzzle $6\frac{3}{4}$ inches from end to lines connecting orbits, $5\frac{3}{4}$ inches wide near the middle. Two keels behind and between the eyes, diverging posteriorly; a short and nearly transverse keel in front of the eyes. Upper eyelid divided by grooves into three areas; an elevated keel above each ear-opening. Two oblique rows of elevated horn-like shields on each side of the neck, of rather small size, four in the inner, three in the outer row, the third of the inner and second of the outer form, with two large elevated median plates, a transverse row. Four very high, short, keel-like postcervicals. Eight rows of dorsal shields, excepting anteriorly, where there are six in the first cross row, and four in the two succeeding: all are like heads of spikes keeled. Four rows on the tail at its middle. Lateral caudal shields continuous, abruptly elevated like the dorsals, subquadrate. Sides with small rounded scales; width between dorsals and ventrals equal to length of third dorsal cross series. A large row of plates on the inner side of the forearm. Claws long; no palmar webs. Abdominal rows eleven, each plate with a thin ossification; two or three large plates in the thoracic cross row. End of tail little serrate above, scarcely compressed. From end of muzzle to occipital 12 inches, to between femora 32 inches; from latter point to end of tail 50 inches: total 7 feet, 10 inches.

"Colour dark brown, with vertical yellow bars on the sides and tail, the former very irregular. Chin, throat, under and upper lips yellow, without spots."

Alligator helois, *Cope, Proc. Acad. Nat. Sc. Philad.* 1865, p. 185.

"*Hab.* Unknown (single specimen, Mus. Munich).

"This rugged-looking species belongs to the genus *Alligator* as restricted by Gray, in which the prolongation of the nasal bones separates the external nares, and there is no cross ridge between the orbits. It approaches *Jacare* in that an external portion of this cross ridge exists on each side. The habitat is not known, as the single specimen I have seen preserved is without label in the Museum of the University of Munich. Through the courtesy of Prof. C. von Siebold, I was enabled to make the above description."

Order RHYNCHOCEPHALIA.

Body with four limbs and elongated tail covered with small scales. Head quadrangular. Belly and underside of tail with four-sided smooth scales, in cross series. Tail with longitudinal ridges of compressed spines. Limbs four. Toes 5–5. Anus transverse. Claspers none. Penis none. "Quadrate bone suturally and immovably united with the skull and pterygoid; columella present. Parts of the ali- and orbito-sphenoid region fibro-cartilaginous; rami of mandible united by a short fibrous ligament. Temporal region with two horizontal bars. Vertebræ amphicœlian. Copulatory organs none."

Rhynchocephalia, *Günther, Phil. Trans.* clvii. p. 595, t. 26, 27, 28.

"Its chief peculiarities consist in the structure of the

skull, amphicœlian vertebræ (Owen), uncinate processes of the ribs, presence of a complicated abdominal sternum, in the dentition, absence of a copulatory organ, &c."—*Günther, Zool. Record*, 1867, p. 133.

This order has all the appearance of Lizards, but it wants the claspers on the side of the vent, used in copulation, and usually falsely called a penis; but they have no relation to that part (see Gray, 'Ann. & Mag. Nat. Hist.' 1871, vii. p. 283), which are always found in Lizards, Snakes, and Amphisbænians; and the quadrate bones of the skull, as in Crocodiles and Tortoises, are suturally united to the skull, and not articulated to it as in Snakes and Lizards.

The sexual organs of Reptiles have been misunderstood. Most authors have considered Lizards and Snakes had two *penes*; but the examination of the Monitors has shown that what have been called *penes* were only *claspers*, by which the males held on during connexion, as in the Sharks and Rays among fish, and also in Snakes and Lizards, which, like nearly all birds, except the Ducks, have no *penis* or entering organ. The Reptiles are variable in these particulars. The Tortoises and Crocodiles have an entering organ and no claspers. The Amphisbænians, Snakes, and Lizards have no entering organ but distinct claspers. The *Rhynchocephalia*, according to Dr. Günther, have neither entering organ nor claspers.

SPHENODON.

Head quadrangular, covered with small scales. Throat with a cross fold. Nape and back with a crest of compressed spines. Body covered with small scales. Belly and underside of the tail with large squarish, keelless, flat scales placed in cross series. Tail compressed, triangular, covered with small scales, and with a ridge of large compressed spines. Legs strong. Toes 5–5, short, strong, cylindrical, slightly webbed at the base, covered above and below with small scales. Claws short, blunt. Femoral pores none. Preanal scales small, a few of them are placed in the centre.

Sphenodon, *Gray, Zool. Miscell.* p. 14, 1831, from skull (*not* Sphenodus).
Hatteria, *Gray, Zool. Miscell.* p. 72, March, 1842; *Ann. & Mag. Nat. Hist.* 1869, iii. p. 167; *Cat. Liz.* 1845, p. 249.
Günther, Phil. Trans. 1867; *Zool. Rec.* 1869, p. 111.
Rhynchocephalus, *Owen, Trans. Geol. Soc.* 1845, vii. p. 64, t. 6. f. 5 & 7 (skull); *Cat. Osteol. Spec. Mus. Coll. Surg.* i. p. 142, 1853.

The skull of this Lizard was described in 1831 in the following words:—"In the skull of an animal allied to *Agama* or *Uromastyx*, in the College of Surgeons, I have observed that the ramus (*os complémentaire*, Cuv. Os. Fos. fig. *c*) of the lower jaw rubs against the lateral processes of the pterygoid bones, so as to prevent the lower jaw from moving from side to side, and that in the species under consideration the hinder part of the upper jaw has a series of teeth about half the length of the outer series placed on a ridge just on the inner edge of the outer teeth, leaving a groove between the two series for the lower jaw to fit into. This skull will doubtless form the type of a new genus which I propose to call *Sphenodon*."

Prof. Owen, eleven years afterwards, described and figured the same skull in the Trans. Geol. Soc. vii. 1845, p. 64, t. 6. f. 5 & 7, and again, twenty-two years afterwards, in the Cat. Osteol. Spec. Mus. Coll. Surg. i. 1853, p. 42, and gave it the name of *Rhynchocephalus*. Dr. Günther, as well as Prof. Owen, overlooked my first description. Perhaps the label which I had attached to the skull when I examined and named it and the other Reptiles at the request of Mr. Clift and his son, my hospital fellow student, had been lost. Dr. Günther evidently seems to have thought the head was a modern acquisition when Prof. Owen described it.

Another skull in the British Museum was figured in the 'Zoology of the Erebus and Terror;' and the same skull was also figured by Dr. Günther as *Hatteria punctata*.

1. Sphenodon punctatum. (Tuatera or Narara.)

Olive; sides and limbs with minute white specks, beneath yellowish; the spines of the nuchal and dorsal crests yellow, of the caudal brown. The scales of the back, head, tail, and limbs small, granular, nearly uniform. The irregular folds in the skin are fringed at the top with a series of rather large scales; an oblique ridge of larger scales on each side of the base of the tail, and a few shorter longitudinal ridges of rather smaller ones on each side of the upper part of the tail.

Sphenodon, *Gray, Zool. Miscell.* p. 13, 1831 (skull only).
Hatteria punctata, *Gray, Zool. Miscell.* p. 72, 1842; *Cat. Liz. Brit. Mus.* p. 249, 1845; *Zool. Erebus & Terror*, t. (animal and skull).
Günther, Phil. Trans. 1867 (anatomy).
Rhynchocephalus, *Owen, Trans. Geol. Soc.* vii. 1845, p. 64, t. 6. f. 5–7 (skull); *Cat. Osteol. Spec. Mus. Coll. Surg.* i. p. 142, 1853 (skull only).
Monstrous Lizard, *Cook's Third Voyage*, i. p. 153, 1785.
Tuatera or Narara, *Dieffenb. New Zeal.* ii. p. 205, 1843.

Hab. New Zealand, Bay of Plenty.

Dr. Dieffenbach having presented to the British Museum

a Lizard which the natives called *Tuatera*, I described it at p. 72 of the 3rd number of the 'Zoological Miscellany,' which was published on the 1st of May, 1842, as a new genus, under the name of *Hatteria*, belonging to the family *Agamidæ*, calling the species *Hatteria punctata*, without observing that I had previously described the skull under the name of *Sphenodon*. The animal was afterwards figured with its skull, afterwards obtained, in the 'Zoology of the Erebus and Terror.'

Dr. Dieffenbach observes that the species "lives in holes, especially on the slopes of the sandhills of the shore. The older missionaries say it was formerly very common, and the natives lived upon it; but for the last fifty years it has been scarcely ever seen." This specimen was found on a small rocky island, two miles from the coast, in the Bay of Plenty, and was given to Dr. Dieffenbach alive, but shortly died, as it would not eat any thing that was offered to it. It is extremely sluggish in captivity, and could be handled without any attempt at resistance or biting. The natives called it Tuatera.

Order AMPHISBÆNIA (AMPHISBÆNIANS).

Body elongate, cylindrical, naked, with square imbedded plates placed in cross rings divided into two sets by a slight longitudinal groove on each side. Tail continuous, short, blunt. Tongue not sheathed, flat, enlarged and nicked at the end, ending in two smooth threads; the rest covered with large flat papillæ or scales. Eyes small, under the skin; eyelid none. Ears hidden under the skin. Mouth small; jaws not extensile. Feet none, or rarely in front. Vent rather transversely plaited. Claspers one on each side. Skull very solid, orbits incomplete; tympanic bone enclosed in the skull, oblique. Parietal bone simple. Temporal and mastoid bones scarcely separate.

Amphisbænians (Amphisbænia), *Gray, Cat. Tort. &c.* 1844, p. 68.
Lacertilia, Amphisbænoidea, *Stannius.*
Günther, Phil. Trans. 1872.

Stannius and Günther arrange these animals with the Lizards.

Sir Andrew Smith kindly presented to the British Museum, along with a number of other Reptiles which he has described, the types of his genus *Monotrophis*, which I had not before seen; and having received from Mr. Welwitsch and from the collection of my late excellent and lamented friend Dr. Balfour Baikie two Amphisbænians from Africa, and from Mr. Bates a species from the Amazons which I believed had not hitherto been recorded in the Catalogue, I proceeded to examine them; and for the purpose of making the comparison more complete, I was led to study all the specimens of this tribe we have in the Museum.

Examination of the species in the British Museum dissatisfied me with the manner in which the species had hitherto been arranged and described; and after repeated examination, I have reduced my observations to the following results:—

The determination of the species themselves, and the means which a paper resulting from the reexamination and comparison of all the species in a large collection affords to a student, are much more certain than any isolated description of the species regarded as new, however detailed and particular the description may be; and in a comparative review of the species of a group or order the distinctions may be stated in a more condensed form.

The Amphisbænians are very rarely collected; hence few species are found in museums and noticed in systematic catalogues. This is explained by their living almost exclusively in the nests of ants, and being seldom seen by the casual observer. There is reason to believe that every country which has ants has some form of Amphisbænians. Until lately they were thought to be confined to Tropical America, though one was described by Vandeli as occurring in Spain as long ago as 1780; but his essay and the animal itself were alike so little known to naturalists, that Professors Hemprich (in 1820) and Wagler each described Vandeli's species as new, the latter as a South-American species. Professor Kaup described a species from North Africa in 1830, and M. Gervais redescribed it as new in 1835. MM. Duméril and Bibron have described a specimen in the Leyden Museum from Guinea; Dr. Andrew Smith one as occurring at the Cape; and Dr. Peters has added another from the east coast of Africa. The number of African species is in this Catalogue raised to seven. As yet none have been received from Asia proper; but Sir Charles Fellows brought from Xanthus the same species that is found in Spain, Portugal, and North Africa.

The following table shows the geographical distribution of the species here recorded:—

Eastern Hemisphere.

Fam. Trogonophidæ.

1. *Trogonophis Wiegmanni.* N. Africa.

Fam. Amphisbænidæ.

2. *Blanus cinereus.* Spain, N. Africa, Asia Minor.

3. *Amphisbæna? violacea.* East Africa.
4. *Cynisca leucura.* Guinea.
5. *Baikia africana.* W. Africa.

Fam. LEPIDOSTERNIDÆ.

Tribe *Cephalopeltina.*

6. *Monotrophis capensis.* S. Africa.
7. *Dalophia Welwitschii.* W. Africa.

Western Hemisphere.

Fam. CHIROTIDÆ.

1. *Chirotes lumbricoides.* Mexico.

Fam. AMPHISBÆNIDÆ.

2. *Amphisbæna alba.* Brazil.
3. *A. americana.* British Guiana.
4. *A. Petrei.* Brazil.
5. *A. vermicularis.* Brazil.
6. *A. Darwinii.* Monte Video, Buenos Ayres.
7. *Bronia brasiliana.* Brazil.
8. *Sarea cæca.* W. Indies.
9. *Cadea punctata.* Cuba.
10. *Anops Kingii.* Buenos Ayres.

Fam. LEPIDOSTERNIDÆ.

11. *Lepidosternon microcephalum.* Brazil.
12. *L. Grayi.* Tropical America.
13. *L. phocæna.* Buenos Ayres.

Tribe *Cephalopeltina.*

14. *Cephalopeltis lepidosterna.* Brazil.

The rings of oblong scutella on the skin are in most species interrupted on the sides, and in some species also on the vertebral line; these interruptions form a more or less wide depressed groove on the surface of the body, and are called the lateral and dorsal lines.

The skin at this interruption is usually marked at each transverse ring with two oblique grooves, which form a cross and divide the space into four minute triangular shields; in some cases, where the line is wider and less sunken, the transverse ring of shields is only divided at the sunken line by a single oblique groove caused by the tapering end of one of the oblong shields going before the end of the other. Sometimes this is the case with the dorsal line, and not with the lateral one. In some of the species, instead of only the four triangular shields in the lateral line, the shield between the cross groove is divided into several minute scale-like shields.

In some of the larger species, as *Amphisbæna alba*, some of the rings of shields are marked with an oblique groove crossing several shields, dividing each of them into two parts; but these seem to be mere individual variations occurring on several parts of the back of some specimens, and not present in others.

Duméril and Bibron give the number of the teeth as one of the specific characters. I have not been able to verify their observations; they give the following as the number. There seems to be always an odd number of intermaxillary teeth, the middle one being usually large.

Trogonophis Wiegmanni	$\frac{4.5.4}{9.9}=\frac{13}{18}$
Chirotes caniculatus	$\frac{3.7.3}{6.6}=\frac{13}{12}$
Amphisbæna americana and *A. alba*..	$\frac{5.5.5}{8.8}=\frac{15}{16}$
—— *Petrei*	$\frac{5.7.5}{8.8}=\frac{17}{16}$
—— *Darwinii*	$\frac{4.7.4}{7.7}=\frac{15}{14}$
Sarea cæca	$\frac{5.5.5}{7.7}=\frac{15}{14}$
Cadea punctata	$\frac{4.7.4}{8.8}=\frac{15}{16}$
Anops Kingii ..... / *Blanus cinereus*	$\frac{4.7.4}{7.7}=\frac{15}{14}$

SYNOPSIS OF THE FAMILIES AND GENERA.

I. *Teeth conical, on the edge of the maxilla.*

I. TROGONOPHIDÆ.

1. Trogonophis.

II. *Teeth on inner side of maxilla.*

II. CHIROTIDÆ. Body covered with uniform, four-sided shields. Legs two, anterior.

1. Chirotes.

III. AMPHISBÆNIDÆ. Body covered with uniform square scales. Legs none.

Tribe I. AMPHISBÆNINA. Head depressed, rounded on the sides in front; nostrils on the upper part of the sides of the head.

A. *Lateral and dorsal lines distinct.*

1. Blanus.

B. *Lateral lines distinct. Dorsal none, or very indistinct.*

a. *Nasal plates large, extending across the muzzle.*

2. Amphisbæna. Head broad, depressed.

3. Cynisca. Head narrow; nose conical.

b. *Nasal shields small, separate above on the side of a large swollen rostral shield.*

4. Bronia.

C. *Lateral and dorsal lines not defined, or the lateral line only visible on the hinder part of the body.*

5. **Sarea.** Rostral rounded in front, placed behind the triangular nasal.

6. **Cadea.** Rostral truncated at the tip, convex in front; nasals oval, lateral.

Tribe II. Anopina. Head compressed, keeled on the sides in front; the nostrils lateral, on the underside of the keels.

A. *Lateral line distinct and impressed.*

7. **Anops.**

B. *Lateral line none or only very slightly visible on the hinder part of the body.*

8. **Baikia.**

IV. LEPIDOSTERNIDÆ. Body with a sternal disk formed of very differently shaped shields.

Tribe I. Lepidosternina. Head conical, covered with symmetrical polygonal shields.

1. **Lepidosternon.**

Tribe II. Cephalopeltina. Head depressed, covered above with a flat, horny, nail-like shield, either simple or transversely divided.

A. *Pectoral disk formed of large, diverging, unequal, polygonal shields. Crown-shield divided across.*

2. **Cephalopeltis.**

B. *Pectoral disk formed of six or eight elongate longitudinal parallel shields. Head-shield single.*

3. **Monotrophis.** Head-shield without any slit on the hinder part of its side edge.

4. **Dalophia.** Head-shield with a linear slit on the hinder part of its side edges.

I. *Teeth on the edge of the jaw.*

Fam. I. TROGONOPHIDÆ.

Head oblong, depressed, rounded below; nostrils lateral, in large nasal shields; teeth conical, on the edge of the maxilla. Body cylindrical, covered with rings of uniform, elongate, oblong, four-sided shields, without any sternal disk; lateral line sunken, narrow, covered with a few minute scales; preanal pores none; tail conical, acute.

Glyphodermes acrodontes, *Dum. & Bibr. Erp. Gén.* v. p. 467.
Trogonophidæ, *Gray, Cat. Tort. &c.* 1844, p. 68; *P. Z. S.* 1865, p. 445.

1. TROGONOPHIS.

Head oblong, depressed; nasal shields large, united by a short straight edge, behind the large triangular convex rostral. Crown with two pairs of shields; temple with many small shields. Upper labial plate moderate; lower labial shield larger, with a series of large chin-shields on each side, and a central gular one. Tail conical, acute. Preanal pores none.

Skull something like that of *Acontias*.

Trogonophis, *Kaup, Isis*, 1830, p. 880.
Gray, Cat. Tort. &c. 1844; *P. Z. S.* 1865, p. 445.
Gervais, Ann. Sci. Nat. 1854, xx. t. 15. f. 3 & 4, p. 6.

1. Trogonophis Wiegmanni.

Trogonophis Wiegmanni, *Kaup, Isis*, 1830, p. 880, t. 861.
Féruss. Bull. Sci. Nat. xxv. p. 203, 1831.
Dum. & Bibr. Erp. Gén. v. p. 470.
Gray, P. Z. S. 1865, p. 445.
Amphisbæna elegans, *Gervais, Bull. Sci. Nat. de France*, 1855, p. 135; *Mag. Zool.* 1835, class 3. t. 11 (details not good).

Hab. Tangiers (*Fraser*, B. M. 1848); N. Africa (B. M. 1846); Algeria (*Duméril*, B. M.).

This animal was first described by Dr. Kaup, who showed that the teeth of it were placed on the edge of the jaw, as in the genera of the family *Agamidæ*, which are all confined to the eastern hemisphere and Australia, while all the other genera of the order that have been examined have the teeth on the inner side of the jaw, as in the family *Iguanidæ*, which is restricted to the New World.

It was afterwards described by M. Gervais; and even when Dr. Kaup had informed him, after inspecting the specimens, that it was the same as he had previously described, he still regarded it as new, because he said the skull did not agree with Dr. Kaup's figure: but this was a mistake. Dr. Kaup figured the skull of *Trogonophis* and of an *Amphisbæna* for the sake of showing the difference between them; and M. Gervais must have compared his animal with the wrong figure.

II. *Teeth on the inner side of the edge of the jaw.*

Fam. II. CHIROTIDÆ.

Head depressed, rounded on the sides; nostrils on sides; teeth on the inner side of the maxilla. Body cylindrical, covered with rings of uniform, oblong, four-sided shields, and possessing two short weak front limbs provided with five subequal clawless toes; lateral line sunken, covered with scales; preanal pores distinct. Tail cylindrical.

Chirotidæ, *Gray, Cat. Tort. &c. B. M.* 1844, p. 74; *P. Z. S.* 1865, p. 445.

Hermann, in 'Obs. Zool.,' thought this genus might be a larva.

1. CHIROTES.

Bipes, *Latr.*
Chalcides, *Daudin.*
Bimanus, *Oppel*, p. 46.
Chamæsaurus, *Schneider*, *Schinz.*
Chirotes, *Cuvier*, *R. A.*
Gray, *Ann. Phil.* 1825, x. p. 204.
(Skeleton) *Müller in Tiedem. Zeitsch. Phys.* ii. 273, t. 21. f. 8, 9, 10.

1. Chirotes lumbricoides. B.M.

Lacerta lumbricoides, *Shaw*, *Nat. Misc.* vi.
Lacerta mexicana, *Donnd. Zool. Beit.* iii. p. 135.
Lacerta sulcata, *Suckow*, *Thier.* iii. p. 147.
Chirotes lumbricoides, *Flem. Ph. Zool.* ii. p. 278.
Gray, *Cat. Tort.* 1844, p. 74.
Chirotes canaliculatus, *Cuv. R. A.*
Merrem, *Tent.* p. 181.
Gray, *P. Z. S.* 1865, p. 446.
Chirotes mexicain, *Bory.*
Le Cannelé, *Lacép. Q. O.* i. p. 613.
Bipes canaliculatus, *Bonnat. Erp.* p. 68, t. 12. f. 6.
Chamæsaurus propus, *Schinz.*
Chalcides propus, *Daud. Rept.* iv. p. 372, t. 58. f. 4.
Bimanus propus, *Oppel*, p. 46.

Hab. Tropical America, Mexico.

Fam. III. AMPHISBÆNIDÆ.

Head oblong, rounded below; nostrils lateral, in nasal shields; teeth conical, on the inner edge of the maxillæ. Body cylindrical, covered with rings of uniform, elongate, four-sided shields, without any sternal disk; preanal pores distinct; lateral line linear, sunken, with a few small scales. Legs none. Tail cylindrical, rounded at the end.

Amphisbænidæ, *Gray*, *Ann. Phil.* 1825, x. p. 203; *Cat. Tort. &c.* 1844, p. 69; *P. Z. S.* 1865, p. 446.
Gervais, *Ann. Sci. Nat.* 1854, xx.

Tribe I. AMPHISBÆNINA.

The head depressed, rounded on the sides in front. Nostrils on the upper part of the sides of the head.

A. *Lateral and dorsal lines distinct, sunken, covered with small triangular scales. Nasal shields large, square, lateral, forming a part of the edge of the upper lip, and separated in front by a broad, square, convex rostral shield.*

1. BLANUS.

The rostral square, convex. The nasal shields large, forming part of the edge of the upper lip. The crown with a large pentagonal frontal shield and two pairs of square shields behind it. Eye-shield triangular, between the upper edge of the front labial shield and the frontal. Temples covered with a series of squarish shields; labial shields large, the hinder smallest; the lower shields without any chin-shield between them and the gular one. Tail rather tapering, blunt; preanal pores distinct.

Skull, Gervais, Ann. Sci. Nat. 1854, xx. t. 14. f. 5, 6, 7.

Blanus, *Wagl. Amph.*
Gray, *Cat. Tort. &c.* p. 72, 1844; *P. Z. S.* 1865, p. 446; *P. Z. S.* 1865, p. 447.

1. Blanus cinereus.

Blanus cinereus, *Gray*, *l. c.* p. 72; *P. Z. S.* 1865, p. 446.
Amphisbæna cinerea, *Vandeli*, *Mem. Acad. Lisbon*, i. 1780.
Gervais, *Mag. Zool.* 1836, t. 10.
Dum. & Bibr. E. G. v. p. 505.
Amphisbæna oxyura, *Wagler in Spix*, *Brasil.* p. 72, t. 35. f. 1.
Amphisbæna rufa, *Hempr. Berl. Gesellsch.* 1829, p. 130.
Blanus rufus, *Wiegm. Arch.* 1836, p. 157.

Hab. North Africa, Tangiers (*Fraser*, B. M.); South-west Europe, Spain (*Vandeli*, 1780); Oporto (*Allen*); Constantinople; Asia Minor.

M. Gervais (Mag. Zool. 1837, class 3. t. 10) gives a figure of *A. cinerea*; but the details of the head do not perfectly agree with our specimens; perhaps this may be from want of care in the artist. The number of pairs of plates on the occiput varies from two to four.

B. *Lateral lines linear, distinct, sunken. Dorsal none, or very indistinct. Nasal shields not forming part of the upper lip.*

a. *Nasal plates large, extending across the muzzle, united by a long straight suture, or united into one cross band; the rostral triangular, under front edge of nasals. Crown with two pairs of broad shields.*

2. AMPHISBÆNA.

Head depressed, broad, and rounded in front. Frontal plates with one or two pairs of rather smaller similar plates behind them. Preanal pores eight.

Amphisbæna, *Gray*, *Ann. Phil.* 1825, x. p. 203; *Cat. Tort. &c.* 1844, p. 70; *P. Z. S.* 1865, p. 447.

* *Head depressed, broad; occiput covered with square shields like the body; preanal plates numerous.*

1. Amphisbæna alba. B.M.

Body thick, one-coloured, with only one pair of plates behind the frontal plates. Occiput shielded like the body.

Amphisbæna alba, *Linn. Mus. Adolph.* p. 26, t. 4. f. 2.
Dum. & Bibr. E. G. v. p. 484.
Gray, Cat. Tort. &c. 1844, p. 70; *P. Z. S.* 1865, p. 447.
Amphisbæna rosea, *Shaw, Nat. Misc.* iii. t.
Amphisbæna pachyura, *Wolf, Abbild.* ii. p. 61, t. 17.
Amphisbæna flavescens, *Neuwied, Abild.* t.
Wagler, Icon. t. 16. f. 1.
Schinz, Amph. p. 129, t. 46.
Le Blanchet, *Lacép. Q. O.* ii. t. 21. f.

Hab. Brazil.

Preanal pores vary from six to eight, and the plates in front of the cloaca vary in size.

Varies in the size and form of the hinder pair of frontal plates; preanal pores eight, often seven.

There is a specimen in the British Museum sent by Mr. Brandt under the name of *A. Darwinii*.

2. Amphisbæna americana. B.M.

Body rather thick, black, and varied. Two or more pairs of plates behind the frontal plates.

Amphisbæna americana, *Scheuch. P. S.* iv. p. 1179, t. 1129. f. D, t. 1249. f. 10.
Seba, Thes. i. t. 18. f. 3, t. 22. f. 2, 3, t. 73. f. 4, t. 100. f. 3.
Gray, Cat. 1844, p. 70; *P. Z. S.* 1865, p. 447.
Gervais, Ann. Sci. Nat. 1854, xx. t. 14. f. 1–4 (skull).
Amphisbæna fuliginosa, *Linn. L. S.* i. p. 392.
Daud. Rept. t. 91. f. 2.
Dum. & Bibr. E. G. v. p. 480.
Amphisbæna vulgaris, A. varia, A. magnifica, *et* A. flava, *Laur. Syn.* pp. 119–122.
Guérin, Icon. t. 18. f. 1.
La Enfumée, *Lacép. Q. O.* ii. p. 459.

Hab. Tropical America: British Guiana, Berbice, Demerara (B. M.).

The labial shields vary in number and shape; the shields behind the frontal vary in number and size, but they are generally in pairs and subsymmetrical.

Gervais figures the skull of the species (Ann. Sci. Nat. 1854, xx. t. 14. f. 4).

3. Amphisbæna camura.

Body thick, short. Tail short, obtuse, with sixteen rings. Preanal plates ten, longer than broad; preanal pores four. Muzzle abruptly contracted, short, higher than broad, swollen, arched in profile. Rostral plate five-sided. Naso-rostrals nearly transversely parallelogrammic; fronto-naso-rostrals nearly as broad as long. Occipitals rounded anteriorly and posteriorly. Labials four, three high. Eye in the superior angle of the ocular, which is acute anteriorly and bounded behind by three segments of the first annulus. Mental plate nearly as broad as long. Length of head and body 15 inches, of tail 2 inches 6 lines. Head and upper parts of body and tail brown, below and a broad collar yellow.

Amphisbæna camura, *Cope, Proc. Acad. Nat. Sci. Philad.* 1865, p. 350.

Hab. Paraguay.

Nearly allied to *A. angustifrons*, Buenos Ayres. The head and plates are relatively much shorter and more obtuse; there is one more labial; the yellow collar is not seen in the latter.

4. Amphisbæna heterozonata.

Each lateral scutellum finely punctulated with black. Verticilli 170–180; 18 on the tail.

Amphisbæna heterozonata, *Burm. Reise d. La Plata*, ii. p. 527, 1861; *Zool. Rec.* 1865, p. 149.

Hab. Mendoza and Tucuman.

** *Head rounded, narrow; preanal pores and preanal shields ten or twelve.*

5. Amphisbæna petræi.

Amphisbæna petræi, *Dum. & Bibr. Erp. Gén.* v. p. 487.
Gray, l. c. p. 80; *P. Z. S.* 1865, p. 447.

Hab. Brazil (Mus. Paris).

*** *Head rounded, narrow, rather produced in front; crown-shields large; occipital shields polygonal. Body slender, one-coloured; preanal pores two or four; preanal plates six, middle ones elongate.*

6. Amphisbæna vermicularis. B.M.

Amphisbæna vermicularis, *Wagl. in Spix, Bras.* p. 73, t. 25. f. 2.
Dum. & Bibr. Erp. Gén. v. p. 489.
Gray, l. c. p. 71; *P. Z. S.* 1865, p. 448.
Hensel, Wiegm. Archiv, 1868, p. 339.

Hab. Brazil (*Dr. Gardner*, B.M., Mus. Paris); Porto Bello (*Capt. Austin, R.N.*, B.M.: head in a very bad state).

7. Amphisbæna? Darwinii.

Amphisbæna Darwinii, *Dum. & Bibr. Erp. Gén.* v. p. 491. *Gray, l. c.* p. 71; *P. Z. S.* 1865, p. 448.

Hab. Monte Video (*Mr. Darwin*, Mus. Paris).

8. Amphisbæna plumbea.

"Head subconical; frontal plates with one pair of smaller similar plates behind them; preanal pores four.

"Amphisbæna plumbea, sp. n.," *Philippi?*

Hab. Mendoza (B.M.).

"Eyes distinct. Scutella longer than broad; verticilli 270+21. Six preanal shields. Uniform reddish grey above, whitish below."

3. CYNISCA.

Head flat, narrow; nose conical, four-sided, rounded at the end; rostral triangular; nasal plates very large, soldered together, covering the front of the head; crown with a small frontal and a pair of parietal shields. Eyes distinct; temples and occiput with large shields. Body very slender; lateral line distinct. Tail cylindrical, elongate, truncated. Preanal pores numerous.

Cynisca, *Gray, Cat. Tort. &c. B. M.* p. 71, 1844; *Proc. Zool. Soc.* 1865, p. 448.

1. Cynisca leucura. B.M.

Cynisca leucura, *Gray, Cat. Tort. &c. B. M.* p. 71; *Proc. Zool. Soc.* 1865, p. 448.
Amphisbæna leucura, *Dum. & Bibr. Erp. Gén.* v. p. 498.
Amphisbæna macrura, *Schlegel, Mus. Leyden.*

Brown; end of tail white.

Hab. Guinea (*Mus. Leyden*) (not Guiana, as stated by mistake in the Catalogue).

2. Cynisca? violacea.

Amphisbæna violacea, *Peters, Berlin Monatsb.* 1854, p. 620; *Wiegmann, Arch.* 1855, p. 49.
Gray, Proc. Zool. Soc. 1865, p. 448.

Hab. East Africa, Inhambane (*Peters*).

This species is unknown to me; it is without a single frontal shield, and has four preanal pores and visible eyes.

3. Cynisca quadrifrons.

Head small, convex; muzzle elongate, rounded; eyes distinct. Rostral triangular, with its outer extremity bent upwards. Two quadrangular naso-rostrals, which are contiguous along their inner edges; after these follow four fronti-naso-rostrals, of which the inner larger ones are long, quadrangular, and somewhat broader in front, and have an inner obtuse and an outer acute angle. The outer fronti-naso-rostrals are narrower but longer than the preceding, with their exterior longer edges bordering upon the ocular and the second supralabial, or even upon a small part of the first supralabial, and their posterior short edges contiguous with the frontal; they also have an inner obtuse and an outer acute angle. Frontals two, which taken together are broader than long, their front edge being convex towards the fronti-naso-rostrals, on the outer side with the apex of their exterior right angle on the ocular; with a long outer posteriorly straight edge, bordering on the anterior upper temporals, and their posterior short straight edges united with a pair of small scales, which in size and shape are like those on the segments of the body. The ocular is irregularly quadrangular, has an anterior acute and an interior obtuse angle, is united by the longest anterior upper edge with the outer fronti-naso-rostral, by the posterior upper edge with the anterior upper temporal, by the posterior lower edge with the third supralabial, and by the anterior lower edge with the second supralabial. Separate ante-, post-, and supraorbitals do not exist. Supralabials three, of which the middle is the smallest, the hinder the largest. Temporal plates, especially the two anterior overlapping ones, very large. Beside the mental, which is longer than broad, and has parallel sides, three infralabials cover the under lip on each side, of which the first is acutely triangular, with its point inserted between the submental and the second infralabial. This last is very long, four-sided, broader in front than behind. To the straight hinder edge of the mental is appended a very cordate posteriorly acute submental, the end of which is bordered by a pair of smaller submentals. Preanal pores four, and anal lip with four rather long segments.

Amphisbæna quadrifrons, *Peters, Berlin Monatsber.* 1862, p. 25.

By the small size of the body and the whole habit, as well as by the large temporal plates, this species is allied to both the hitherto known African Amphisbænians *A. leucura* and *A. violacea*, from which they nevertheless are very easily distinguished.

A. leucura, D. & B., is distinguished by the union of the

naso-rostrals with the fronti-naso-rostrals, by the presence of an odd frontal, a supraorbital, and an anteorbital, by the unusually large first infralabial, and the much larger number (ten) of the preanal pores.

A. violacea, Ptrs. (Monatsb. 1854, p. 620) which agrees in the position and proportion of the rest of the scutella, in the number of the anal pores, and the segments of the anal lip, is distinguished by its single pair of fronti-naso-rostrals, by the extraordinary length of the frontals, which are quite three times as long as broad, and of both temporal plates, which by themselves cover the whole of the temporal region.

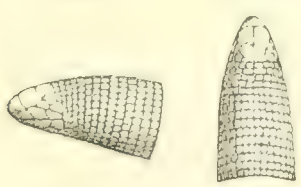
b. *Nasal shields small, separate above, on the side of a large swollen rostral shield.*

4. BRONIA.

Head ovate, rather convex; rostral shield very large, hemispherical, with the small nasal shields inserted in notches on its hinder edge, which is placed over the front labial; crown convex, rounded on the sides, covered with two pairs of shields; the front pair square, the hinder smaller, triangular, with a small triangular occipital shield on its outer side; eye-shield triangular; labial shields $\frac{3-3}{2-2}$, the second upper and front lower large; gular shield single, square, with a cross series of shields behind it. Body cylindrical; lateral line well marked; the dorsal shields elongate, narrow; the ventral ones rather broader, smooth; preanal pores four; the preanal shields six or eight, the central pair the largest, the lateral ones very small. Tail blunt.

Bronia, *Gray, Proc. Zool. Soc.* 1865, p. 448.

Fig. 19. Fig. 18.



Bronia brasiliana.

1. Bronia brasiliana. B.M.

Pale brown; dorsal shields with a dark central spot.

Bronia brasiliana, *Gray, P. Z. S.* 1865, p. 448, f. 1, 2.

Hab. Tropical America; Santarem, on the Amazons. (*Bates*, B. M.)

C. *Lateral and dorsal lines not defined, or the lateral line only visible on the hinder part of the body; rostral shield small; nasal shields small, far apart, placed on the side of the high rostral.*

5. SAREA.

Head conical; rostral narrow, higher than broad, rounded in front, placed behind the triangular nasal; crown with two pairs of shields; the front largest, elongate, the hinder trigonal; eye-shield triangular; the labial shields $\frac{3-3}{3-3}$, the second upper and lower labial shields very large, the others smaller, with one large gular plate. Body slender, the dorsal scutella square, as long as broad, with a dark central dot; two central longitudinal series of ventral scutella broader than long, smooth, white; the lateral line very indistinct, scarcely visible except on the hinder part of the body. Preanal pores four; preanal shields six, square. The eyes are slightly visible through the shields.

Sarea, *Gray, Cat. Tort. &c.* 1844, p. 71; *P. Z. S.* 1865, p. 449.

1. Sarea cæca. B.M.

Amphisbæna cæca, *Cuvier, R. A.* p. 773.
Dum. & Bibr. Erp. Gén. v. p. 492.
Sarea cæca, *Gray, Cat. Tort. &c. B. M.* p. 71, 1844; *P. Z. S.* 1865, p. 449.

Hab. West Indies; Porto Bello (*Capt. Austin, R.N.*, B. M.); St. Thomas's (*A. H. Riise*, B. M.).

The specific name is not characteristic, as the eyes are as much seen through the shield as in many Amphisbænians.

2. Sarea? innocens.

Eyes not visible; rostral shield triangular, not quadrangular (as in *A. punctata*); two fronti-naso-rostral shields; rostral shield low and smooth, not keeled (as in *A. Kingii*).

Amphisbæna innocens, *Weinland, Abhandl. Senckenberg. Gesellsch.* 1863, iv. p. 137, pl. 5. f. 2.

Hab. San Domingo.

Understood to have been previously described (Zool. Rec. 1865, p. 149). Dr. D. F. Weinland does not characterize, but gives a long description, with the following observations.

The species is allied to *A. cæca*, but differs in the following points:—1, there are 212 verticilli between the corner of the mouth and vent (226–229 in *A. cæca*); 2, the scutella are oblong, and not square as in *A. cæca*; 3, there is no trace of a median dorsal groove as in *A. cæca*.

3. Sarea? fenestrata.

Diphalus fenestratus, *Cope, Proc. Amer. Phil. Soc.* 1860, p. 164.
Amphisbæna antillensis, *Zool. Rec.* 1865, p. 149.
Reinhardt & Lütken, Zool. Rec. 1869, p. 111.

Hab. Tropical America.

6. CADEA.

Head conical; rostral narrow, higher than broad, truncated at the tip, convex in front; nasals ovate, lateral; crown with two large, triangular shields; frontal with a small linear shield on each side of it; and two pairs of square occipital shields, the hinder pair smaller; eye-shield rhombic; eyes hidden; labial shields $\frac{3-3}{3-3}$, subequal, middle one in each lip largest; temples covered with square shields; gular plate single, elongate. Body cylindrical; lateral line very indistinct, scarcely to be distinguished, except on the hinder part of the body; shields of the back square, of the under surface rather wider, but scarcely wider than long; preanal pores four; the preanal shields six, central ones elongate.

Cadea, *Gray, Cat. Tort. &c. B. M.* p. 71, 1844; *Proc. Zool. Soc.* 1865, p. 450.

1. Cadea punctata.

Cadea punctata, *Gray, Cat. Tort. &c.* p. 71; *Proc. Zool. Soc.* 1865, p. 450.
Amphisbæna punctata, *Bell, Zool. Journ.* ii. p. 236, t. 20. f. 2.
Dum. & Bibr. Erp. Gén. v. p. 494.
J. Villers, Rep. Fis. Nat. de Cuba, ii. 1867, pp. 69, 72.
Amphisbæna cæca, *La Sagra, Cuba*, p. 195, t. 21.

Pale brown, dotted and varied with deeper brown.

Hab. Cuba (*W. S. MacLeay*, B.M.): the specimen described by Mr. Bell.

Tribe II. ANOPINA.

Head compressed, keeled on the sides in front; the nostrils lateral, on the underside of the keels.

A. *Lateral line distinct and impressed.*

7. ANOPS.

Lateral line distinct, sunken; preanal pores "none" (*Bell*), "four" (*Dum. & Bibr.*).

Anops, *Bell, Proc. Zool. Soc.* 1833, p. 99; *Zool. Journ.* v. p. 391, t. 16. f. 1.
Gray, Cat. Tort. &c. B. M. p. 72, 1844; *Proc. Zool. Soc.* 1865, p. 450.

1. Anops Kingii. B.M.

Anops Kingii, *Bell, Proc. Zool. Soc.* 1833, p. 99; *Zool. Journ.* v. p. 391, t. 16. f. 1.
Gray, Cat. Tortoises &c. B. M. p. 72; *Proc. Zool. Soc.* 1865, p. 450.
Amphisbæna Kingii, *Dum. et Bibr. Erp. Gén.* v. p. 497.
Hensel, Wiegm. Archiv, 1868, p. 343.

Hab. S. America (*P. P. King, C. Darwin*); Buenos Ayres (*D'Orbigny*, Mus. Paris).

I have not been able to examine this genus, which was described by Mr. Bell from a specimen brought from South America by Capt. P. P. King, R.N.; it is described in more detail by Messrs. Duméril and Bibron from specimens obtained by Mr. Charles Darwin.

The existence of the lateral line, which, according to Mr. Bell, "is more distinct than in *Amphisbæna*, though less so than in *Chirotes*," and the account of the plates of the head as described by MM. Duméril et Bibron, show that it must be distinct from the following, which comes from Africa.

B. *Lateral line none, or only very slightly visible on the hinder part of the body.*

8. BAIKIA.

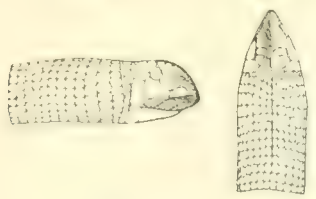
The head compressed, elevated; rostral plate very large, compressed, forming an arched crest from the mouth to the forehead, with a groove on the hinder part over the nostrils; crown with two pairs of band-like shields behind the upper edge of the rostral, the front pair narrow; eye-shield very minute; eye invisible; temples with two small shields; the upper labial shields 3—3; the second upper large, produced, keeled on the side; the hinder, under the temporal shield, larger, square; lower lip covered with a single large shield on each side, separated by a square inferior rostral shield, and by two small gular plates placed one behind the other; nostrils large, lateral, under the edge of the keel of the frontals. Body and chest covered with rings of similar oblong square shields; preanal pores 2—2, separated by a central shield. Tail cylindrical, rather conical at the tip.

Baikia, *Gray, P. Z. S.* 1865, p. 450.

In spirits the skin is loose and inclined to form a fin-

like fold, sometimes on one and sometimes on another part of the body, with a central longitudinal ventral groove, without any appearance of a lateral line.

Fig. 21. Fig. 20.



Baikia africana.

1. Baikia africana. B.M.

Baikia africana, *Gray, P. Z. S.* 1865, p. 451, f. 3, 4.

Hab. West Africa (*Dr. Balfour Baikie*, B.M.).

Fam. IV. LEPIDOSTERNIDÆ.

Head oblong, depressed, with a short horizontal keel in front. Nostrils in shields, under the keel of the rostral shield. Teeth conical, on the inner side of the maxilla. Body cylindrical, covered with rings of oblong, four-sided shields; the sternum with a disk formed of differently shaped shields; preanal pores distinct.

Lepidosternidæ, *Gray, Cat. Tortoises &c. B. M.* p. 73, 1844; *P. Z. S.* 1865, p. 451.

Tribe I. LEPIDOSTERNINA.

Head conical, covered with symmetrical polygonal shields; the pectoral disk covered with many polygonal shields placed in oblique lines; the dorsal and lateral lines well marked, broad, smooth, formed by the overlapping of the narrow ends of the sections of the rings. America.

Lepidosternina, *Gray, P. Z. S.* 1865, p. 451.

1. LEPIDOSTERNON.

Head conical, covered with three pairs of symmetrical and a vertebral shield; rostral shield large, broad, rounded in front; the pectoral shield formed of regular, nearly equal, symmetrical, rhombic or six-sided shields, sometimes united into long shields which are not symmetrical.

Lepidosternon, *Wagler in Spix, Serp. Bras.* p. 70.
Gray, Cat. Tort. &c. p. 73; *P. Z. S.* 1865, p. 451.

* *Sternal plates of central series united into elongated bands.*

Lepidosternon.

1. Lepidosternon microcephalum. B.M.

Head short, broad, the vertebral plate broader than long, six-sided; frontal short, broad, band-like; parietal small, square; ocular higher than broad.

Lepidosternon microcephalum, *Wagler, Serp. Bras.* p. 70, t. 26; *Icon.* t. 16. f. 1.
Müller, Tiedem. Zeitsch. 1832, iv. t. 22. f. 4.
Dum. & Bibr. Erp. Gén. v. p. 505.
Gray, Cat. Tort. &c. B. M. p. 73; *P. Z. S.* 1865, p. 451.
Gervais, Ann. Sci. Nat. 1854, f. 8–11 (skull).
"Lepidosternon macrocephalum, *Müller*," *A. Smith, Z. S. A.* note, t. 5.
Amphisbæna punctata, *Neuwied, Abh.*
Lepidosternon Maximilianus, *Wiegmann.*

Hab. Brazil, Rio (*Dr. Gardner*, B. M.).

The specimen in the British Museum has the shields on each side of the central line of the sternal disk united into an elongate shield, which is not symmetrical on the two sides, and appears like an accidental peculiarity.

In the Free Museum at Liverpool there are two specimens of this species, obtained by Mr. Jobert in Brazil. They are similar, but show that the sternal plates are liable to coalesce and form larger plates in an unsymmetrical manner.

In the larger specimens the first series of sternal plates on each side of the central line are united into longitudinal shields, which are not of equal length. The series of plates on the outer side of them are separate, but not quite symmetrical.

In the other specimen, which is rather smaller, the first series of sternal plates on the sides of the central line, and the second series on the outside of it on the right side, and second and third series on the left side, are united into longitudinal parallel plates, which are of unequal length, the two central ones being the longest, and the two outer plates on the left side much longer than the outer one on the right side.

The head-shields in both these specimens are exactly alike, the central crown-shield being much broader than long; the hinder pair of frontal shields rather shorter than the front pair, and narrower on the central edge by the angular front edge of the crown-shield; the two pairs of occipital shields are shorter than broad, the hinder pair being the smaller, and in one instance have coalesced on one side with the plate of the front pair.

They all have a brown spot on the centre of each of the dorsal scutella.

** *Sternal plates all separate, symmetrical.* Sphenocephalus.

2. Lepidosternon Grayii. B.M.

Head rather short, broad; the vertebral plate hexagonal, elongate, as long as broad; the frontal plate very short and broad; the parietal shields oblique; the occipital much longer than broad; temporal shields larger on the sides of the occipital; plates of the sternal disk symmetrical, in oblique diverging lines.

Lepidosternon Grayii, *A. Smith, MS. Brit. Mus.*
Gray, P. Z. S. 1865, p. 452, f. 5, 6.

Hab. South America? (Brit. Mus.).

Fig. 23. Fig. 22.

Lepidosternon Grayii.

Sternal disk formed of four diverging lines of uniform, similar-sized, symmetrical shields: the shields on the central line smaller, being divided down the centre by a straight suture.

In 1848, Dr. (now Sir Andrew) Smith sent to the British Museum this specimen, with the name of *Lepidosternon Grayii*, informing me that he had described (or intended to describe) it in the 'Proceedings of the Zoological Society' under that name. I cannot find that it has been so described, nor can I find any notice of it in any other work, though it is very like, but evidently distinct from, the *Lepidosternon phocæna* of Duméril and Bibron, figured by M. d'Orbigny (Voy. Amér. Mérid.).

3. Lepidosternon phocæna. B.M.

Head broad; the vertebral plate elongate, small, larger than broad, acute at each end; the frontal and occipital plates large, shorter than broad, the frontal the largest; the parietal plates short, broad, band-like; the plates of the sternal disk uniform, symmetrical, oblique.

Lepidosternon phocæna, *Dum. & Bibr. Erp. Gén.* v. p. 507.
Gray, Cat. Tort. &c. B. M. p. 73; *P. Z. S.* 1865, p. 453.
D'Orbigny, Voy. Amér. Mérid. Rept. t. 6. f. 7–10.

Hab. Buenos Ayres (*Bridges*, B. M.: stuffed).

M. d'Orbigny's figure is very like the preceding species; but the head is represented shorter, the frontal plates are rather larger. The long occipital shield of that species is here represented by two pairs of square shields, as if the large plate of the former species were divided across; it also appears to be a shorter, thicker species.

The stuffed specimen which we received from Mr. Bridges agrees with the figure in all these particulars; but the head appears rather larger, perhaps from its being rather distorted in the preparation.

Both the figure and the specimen belong to a species evidently very distinct from *L. Grayii*, and much thicker.

4. Lepidosternon octostegum.

Lepidosternum octostegum, *A. Duméril.*
Steindachner, Novara Rept. p. 53; *Zool. Record*, 1867, p. 134.

Tribe II. CEPHALOPELTINA.

The head depressed, covered above with a single, simple, or transversely divided, flat, horny, nail-like shield; pectoral disk formed of elongated, symmetrical shields; the dorsal and lateral lines very narrow, indistinct, except near the hinder part of the body.

Cephalopeltina, *Gray, P. Z. S.* 1865, p. 453.

A. *The pectoral disk formed of large, diverging, unequal, polygonal, symmetrical shields; the crown-shield divided into two by a transverse suture.* America.

2. CEPHALOPELTIS.

Head covered with two large shields, the front one smaller: the sternal disk of eight or ten large shields; the two central pairs parallel, one in front of the other; the lateral pairs diverging.

Cephalopeltis, *J. Müller, Tied. Zeitsch. für Phys.* 1831, iv. p. 269.
Gray, Cat. Tort. &c. 1844, p. 73; *P. Z. S.* 1865, p. 454.

1. Cephalopeltis scutigera. B.M.

Cephalopeltis scutigera, *Gray, Cat. Tort. &c. B. M.* p. 73: *P. Z. S.* 1865, p. 454.
Cephalopeltis lepidosternon, *Müller, l. c.* t. 21. f. 6 (skull), t. 22. f. 5 (head).
Amphisbæna scutigera, *Hempr. Naturf. Freund. zu Berlin*, 1820, p. 127.
Lepidosternon scutigerum, *Dum. & Bibr. Erp. Gén.* v. p. 509.
Cephalopeltis Cuvieri, *Müller, Zeitsch. Physiol.* 1832, iv. p. 253, t. 20. f. 5, t. 21. f. 6 & 7.

Coleopeltis Cuvieri, *J. Müller* (fide *A. Smith*).
Lepidosternon Hemprichii, *Wiegm.*

Hab. Brazil (*Müller*).

B. *The pectoral disk formed of six or eight elongate longitudinal parallel shields; head-shield single.* Africa.

3. MONOTROPHIS.

The head covered with a single nail-like shield, without any slits on the hinder part of its side edge; the rostral plate between the nasal plates transverse, four-sided, broader than high; the shields of the sternal disk regular, broad and truncated in front; the rings of shields in front of the sternal disk formed of regular square shields, like those on the rest of the body.

Monotrophis, *A. Smith, Zool. S. Africa, Rept.* t. 47.
Gray, P. Z. S. 1865, p. 454.

1. Monotrophis capensis. B.M.

Monotrophis capensis, *A. Smith, Zool. S. Africa, Rept.* t. 47 (white; pink when alive).
Gray, P. Z. S. 1865, p. 454.

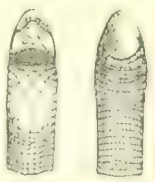
Hab. S. Africa (B. M.). The type specimen of Sir Andrew Smith.

Dr. Peters records *Monotrophis capensis* as found in Mozambique; but on comparison it may prove a distinct species. In my notes I have a reference to *Lepidosternon sphenorhynchum*, Peters, MS., as an East-African species; but I cannot find it described or noticed anywhere. Can it be the name Dr. Peters gave to his *Monotrophis* before he discovered that it had been described by Sir Andrew Smith?

4. DALOPHIA.

The head covered with a single nail-like shield, with a linear slit on the hinder part of its side edges; the rostral plate small, triangular, with the point upwards between the nasal plates; the shields of the sternal disk rather irregular, but symmetrical, each with an acute front edge; the rings of shields in front of the sternal disk formed of unequal but symmetrical polygonal shields.

Fig. 25. Fig. 24.



Dalophia Welwitschii.

Dalophia, *Gray, P. Z. S.* 1865, p. 454.

1. Dalophia Welwitschii. B.M.

Dalophia Welwitschii, *Gray, P. Z. S.* 1865, p. 455, f. 7, 8.
Monotrophis capensis, *Günther, MS. B.M.* (not *A. Smith*).

Pale brown.

Hab. Angola; Pungo Andongo (*Welwitsch*, B.M.).

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